

# THE IRON AGE September 27, 1934

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EIGHTIETH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

# A few of the many uses for **BETHANIZED WIRE**

**H**ERE are some of the products in which the properties of Bethanized Wire have been found of great value.

Bethanized Wire is far ahead of zinc-coated wire made by older processes. The thickness of coating that can be applied—its ability to stand bending and twisting without fracture—its purity, uniformity, and smooth silvery surface—these advantages are leading to the use of Bethanized Wire in a wide range of applications.



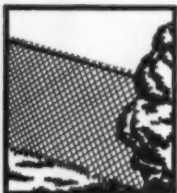
Bethanizing permits the use of steel springs with their superior physical properties in pumps and other locations where alloys have been used. And Bethanized Wire makes possible zinc protection on bed-springs for marine or hospital service.

Bethanized Wire, with its smooth silvery finish, makes an excellent material for spokes in the wheels of baby carriages, tricycles and similar wire-wheeled vehicles. The fabricating operations do not damage the coating.



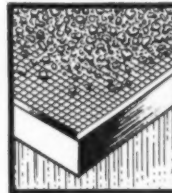
For telephone and telegraph service, Bethanized Wire offers the advantage of a coating that can be put on as heavy as the conditions call for. Higher tensile strength can be provided than is possible in wire coated by the hot-dip process. Bethanized Wire splices without surface cracks.

Wire brushes are another product in which the forming properties of Bethanized Wire have opened the way to the making of a better product with less difficulty in manufacturing. Large quantities of Bethanized Wire are now being used in brush manufacture.



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In screen wire the heavier coatings which Bethanizing makes possible are especially useful as, under the abrasive action of the material being screened, the life of a coating is about proportional to the thickness. A 2.4 oz. Bethanized coating lasts about three times as long as the usual hot-dip galvanizing.



The service life of strand can be much increased by making it of heavily-coated Bethanized Wire. Thick Bethanized coatings stand being woven into strand without damage. Abuse in erection will not cause cracks that offer places for rust to start.

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## A Message to the Metal Congress

By W. A. IRVIN

President, United States Steel Corpn.

It is a pleasure to extend these words of greeting to the National Metal Congress, convening nearby in New York, and to affirm our deep interest in its proceedings. The cooperation of the various societies and associations to make these joint meetings possible is a fine example of the streamlining of technical effort—a kind of effort which is of vast importance to our industry. National Metal Week, with its manifold activities, rightly attracts the attention of all who are directly or indirectly interested in the progress of the technology of metals. Those who are not interested are few in number. We compliment the participating groups on providing this effective forum for the dissemination of knowledge and for the exchange of ideas.

Today we find metals in use on land, at sea, and in the air, performing services considered impossible in years gone by. The new order of things is due largely to the circumstance that metals and alloys are now made and specially processed to meet the particular demands made upon them. But the "know-how" and "know-why" of present practices had to be developed by years of arduous study and experiment in which, happily, art and science went hand in hand. The role played by the technologist has been of outstanding value, and the end is not yet in sight. Men in the modern metal industry are discussing their problems, rationally, in terms that were simply "terms" a few decades ago. Now we have come to realize, thanks to the pursuit of metallurgical science, that such expressions as grain size, metal-slag equilibrium, fatigue, and creep strength have a deep and practical significance.

Additional useful information will be made available during the sessions of the National Metal Congress this fall, presaging further progress, and we are glad to commend the constituent societies for their noteworthy activities.



W. A. IRVIN, Drawn by John Frew for The Iron Age

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# Iron Refined By Griffin Duplex Process

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By ROGERS A. FISKE  
Western Editor, The Iron Age

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USE of the pre-heated blast cupola in combination with an air furnace fired with pulverized coal mixed with pre-heated air is leading to exceptional fuel economies and important improvements in physical and chemical properties of chilled iron being poured at the Sacramento Square plant (Chicago) of the Griffin Wheel Co. The total fuel consumption including cupola and air furnace does not exceed 231 lb. per ton of iron melted. Correcting the consumption of coal on the basis of its cost, which is about one-half the cost of coke, brings the total fuel consumption on a coke basis down to about 195 lb. of coke per ton of iron melted.

The importance of quality and economy to a chilled car wheel manufacturer is shown by the fact that over 2,000,000 freight cars in active service are now equipped with chilled car wheels. Each car travels an average of 10,000 miles a year, which is equivalent to 160 billion wheel-miles annually. Each wheel carries an average load of 6 tons and therefore the service is 960 billion ton-miles each year. The life of the average chilled car wheel ranges from 8 to 10 years. The output of the Griffin Wheel Co. is in normal times 1,000,000 wheels annually requiring a melt of 400,000 tons of iron.

In order to meet the exacting demands of the railroad shipper for quicker deliveries, heavier loadings and economical service, continued improvement is being made in the design, quality of materials, and savings effected in the initial and operating costs of railroad equipment. Consideration of these matters led the company first to design and put into use in its plants the hot-blast cupola only to be followed now by the installation of a hot-blast cupola in combination with a hot-blast air furnace. This new duplex process is melting and refining 180 tons of iron

for the production of 400 car wheels per day of eight hours. It operates on the continuous pour principle. There is no practical reason why this unit cannot be operated on two or three shifts per day thereby increasing its output proportionately.

## High Test Cast Iron

Study of the duplex process reveals that it is particularly adapted for production of high test cast iron. The air furnace has proved to be satisfactory either for batch production or in combination with cupola melting. The physical properties of cast iron produced in the air furnace with no change in chemical composition is improved from 10 to 20 per cent as compared with cupola iron. These properties are said to be due to the removal of non-metallic inclusions, deoxidation and degasification of the metal. This is largely the result of superheating, which consists of heating the metal before pouring to a temperature from 2850 to 2900 deg. F. Superheating produces a molten mixture that is extremely homogeneous and free from graphite nuclei and this is said to be responsible for the

remarkable structural changes that are obtained. The structure of a material produced in the air furnace has an extremely fine grain size. This material has a much more uniform grain size than cupola iron when poured into sections of varying sizes.

Heavy castings made with air furnace iron have a uniform grain size from the outside edge to the center, which usually results in excellent strength and uniform hardness. Castings made with sections 4 in. in diameter have shown exceptional uniformity, Brinell hardness tests at the center running less than 10 points lower than those taken at the edge of the casting.

The microstructure of the air furnace material, due to the above mentioned commercial improvements, consists almost entirely of pearlite having only a trace of cementite and ferrite. The graphite formation is finely divided and uniformly distributed throughout the entire structure. It has been generally agreed that the ideal cast iron microstructure should consist of pearlite with a uniform distribution of finely divided graphite. This structure has proven to give exceptionally fine physical properties.

These improvements, when coupled with various combinations of chemical elements such as are possible to maintain and control in the air furnace, produce a superior product. The most essential change in chemical composition is the reduction in total carbon. Microstructural changes can be controlled more definitely with metal containing a lower carbon and silicon content. Silicon readily promotes graphitization and in the presence of high total carbon promotes the decomposition of combined carbon. Therefore a material having a high total carbon is likely to contain a large amount of free ferrite and irregularly formed particles of primary graphite. If the silicon is favorably low, it may

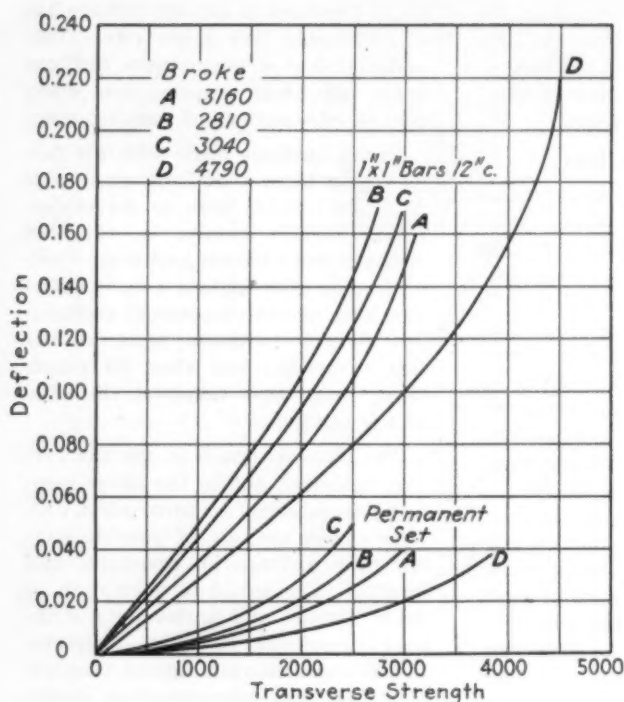
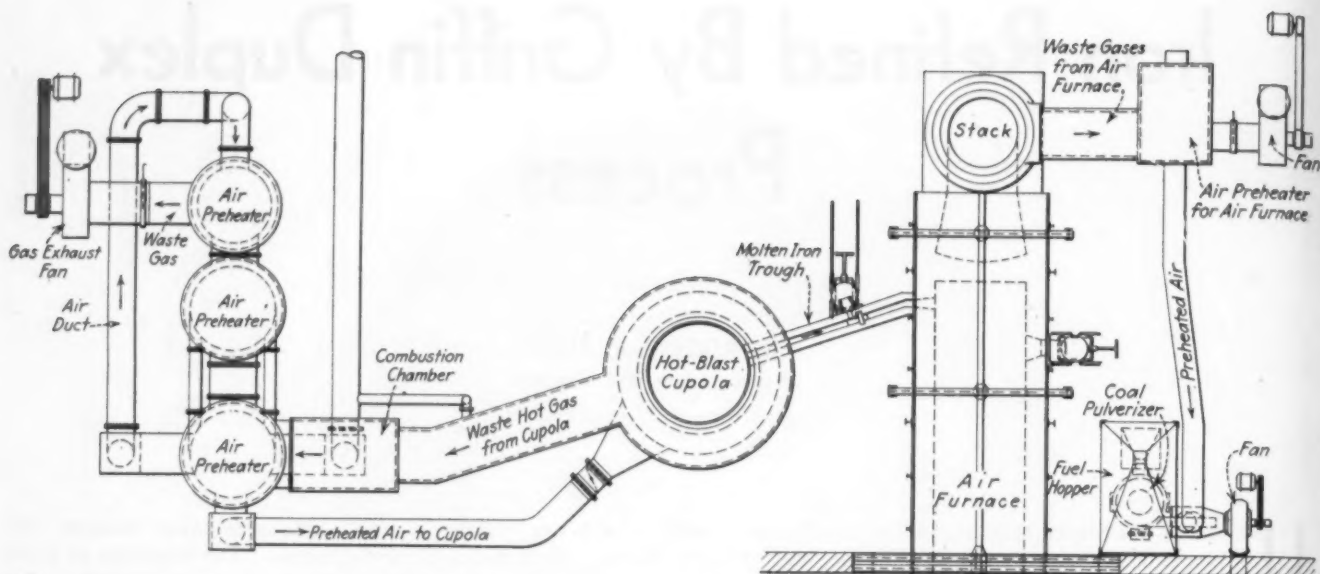
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A FUEL consumption equivalent to 195 lb. of coke per ton of iron is secured at the Chicago plant of the Griffin Wheel Co., through the use of a pre-heated blast cupola in combination with an air furnace using pulverized coal mixed with pre-heated air.

The actual consumption of powdered coal, per ton of iron melted is not over 231 lb., compared to from 700 to 800 lb. per ton required in melting iron from cold stock in an air furnace. The Griffin Duplex process therefore represents a decided advance in fuel economy.

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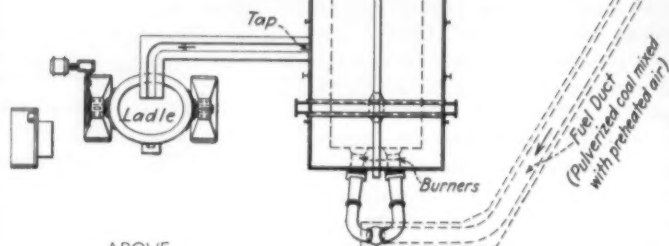
contain a considerable amount of pearlite, but the strengthening effects of this structure will be largely offset by the unequal distribution of coarse graphite flakes.

#### The Duplex Plant

The duplex plant as now set up at the Sacramento works consists of a cupola and its blast preheater, the air furnace and its air preheater and coal pulverizing equipment. The cupola measures 74 in. in diameter and has a melting rate of 28 tons per hr. It is served by a battery of three blast preheaters that are in series. These are made with cast iron tubes and follow the design covered in the Griffin patent 1627536, issued May 3, 1927. Waste gas from the cupola is drawn through a duct to a combustion chamber to which air is admitted,

thereby burning CO to CO<sub>2</sub> and at the same time increasing the temperature of the gas which passes directly into the first preheater unit. A fan connected to the last preheater unit creates the suction to draw the gas over the heater tubes.

Air under pressure enters the preheater at the end opposite the gas inlet and after being preheated passes on to the cupola. It should be noted that the gas and air flow through the



ABOVE  
General plan showing cupola, air furnace, pulverizing equipment and the air preheaters.

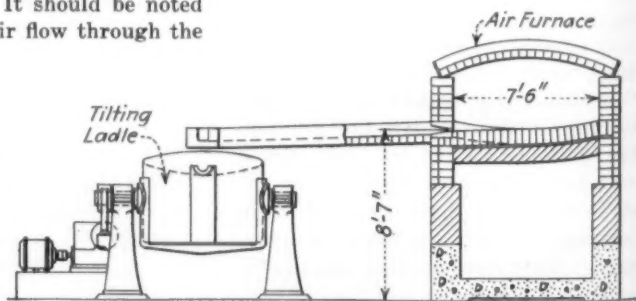
AT LEFT  
Comparative strength and deflection of air furnace and cupola irons.

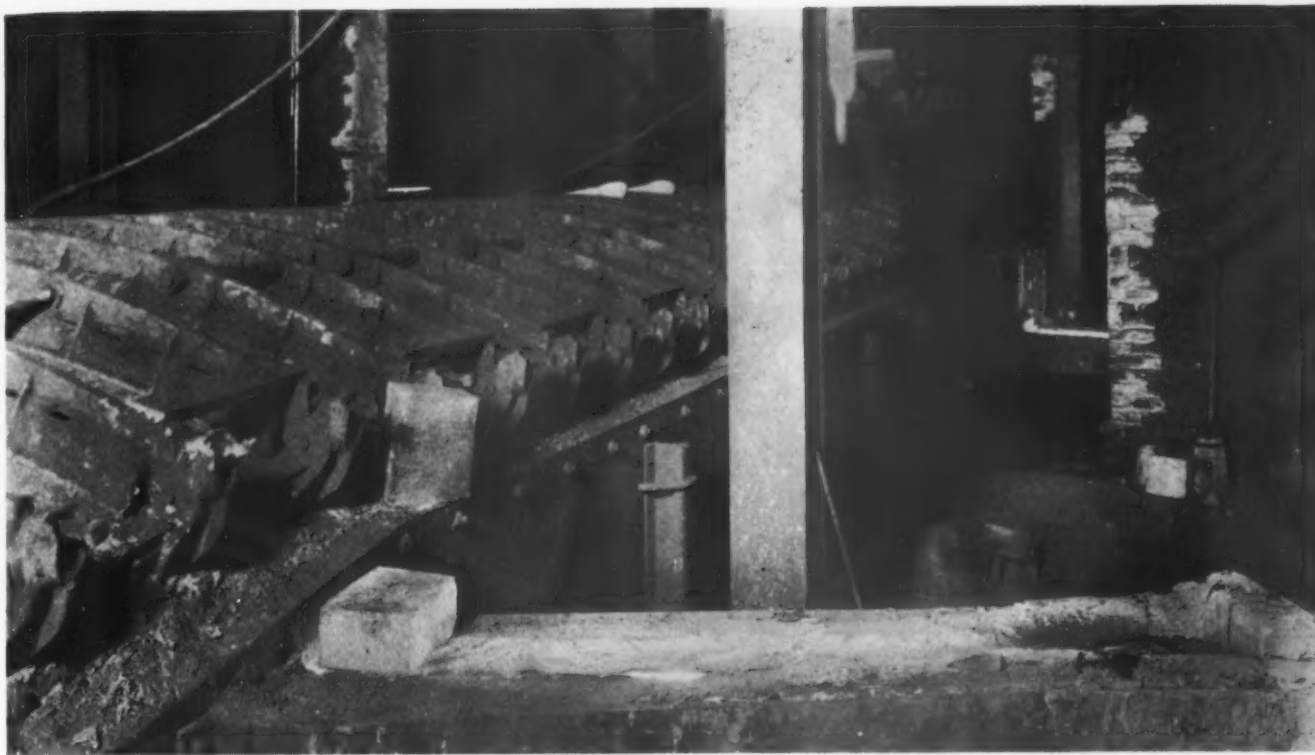
preheater units in opposite directions.

The accompanying table indicates the economy to be realized by the use of the hot blast. Typical temperatures are: gas in combustion chamber 1700 deg. F.; gas leaving cupola 1400 deg.; gas above arch 1550 deg.; waste gas above heater 620 deg.; gas at charging door 150 deg.; and hot blast 600 deg. The blast pressure is usually about 8 oz. and the suction  $\frac{3}{4}$  oz. Actual practice shows the coke required per ton of iron to be 25 lb. for the bed and 134 lb. for melting (including extra), a total of 159 lb.

The air furnace stands near the cupola, the charging end being only a few feet away from the tap hole of the cupola. Inasmuch as this is a continuous process molten iron is conducted from the cupola to the air furnace by means of a clay lined trough.

Inside dimensions of this air furnace are 7 ft. 6 in. by 40 ft. and its capacity is 30 tons of metal.





Top of furnace looking toward firing end. Tapping out trough in background

The air furnace measures 7 ft. 6 in. wide by 40 ft. long (inside dimensions) and has capacity of 30 tons of metal. The bed of the furnace at tap hole is 8 ft. 7 in. above the floor level. From bed to crown of roof arch is 3 ft. 6 in. at firing end and 2 ft. at

the stack end. The stack dimensions are 4 ft. 6 in. inside diameter and 50 ft. high. The tap holes are on the same side of the furnace as is the iron inlet hole. As the iron flows along the bed or hearth of the furnace it travels against the flame and

hot gas. A trough carries the iron from the furnace to a tilting ladle. The furnace design consists of a concrete foundation and brick side walls, and a sand bed underlies the sub-bottom which is covered with ganister over which is the fire brick hearth. The roof consists of a series of bungs, spares of which are prepared in advance so that roof brick falling during operation of the furnace does not delay or interrupt the refinement of iron.

#### Relative Economy From Various Degrees of Pre-Heated Blast in the Cupola

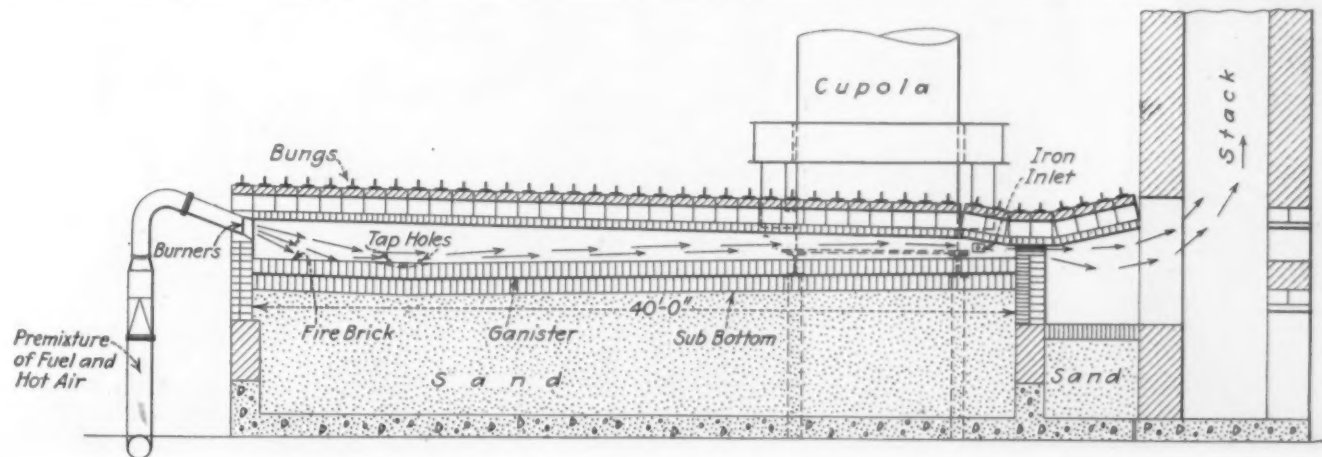
Potential heat 1 lb. coke.....	13,000 B.t.u.
Heat absorbed 1 lb. iron.....	540 B.t.u.

#### DEGREES FAHRENHEIT OF PREHEATED BLAST

	0	200	400	600	800	1,000
Pounds coke to melt 1 ton iron.....	210	182	160	145	135	128
Ratio iron to coke.....	9.5	11.0	12.5	13.8	14.8	15.6
Per cent CO <sup>2</sup> developed.....	12.5	13.0	13.5	14.0	14.5	15.0
B.t.u. developed per lb. coke.....	9,580	9,810	10,040	10,270	10,500	10,270
B.t.u. absorbed by iron.....	5,130	5,940	6,750	7,450	8,000	8,420
Efficiency of cupola, per cent.....	39	45	52	57	61	65
Efficiency of combustion, per cent....	74	75	77	79	81	83
Efficiency of heat absorption, per cent	53	59	67	73	76	79

#### Stack of Conventional Design

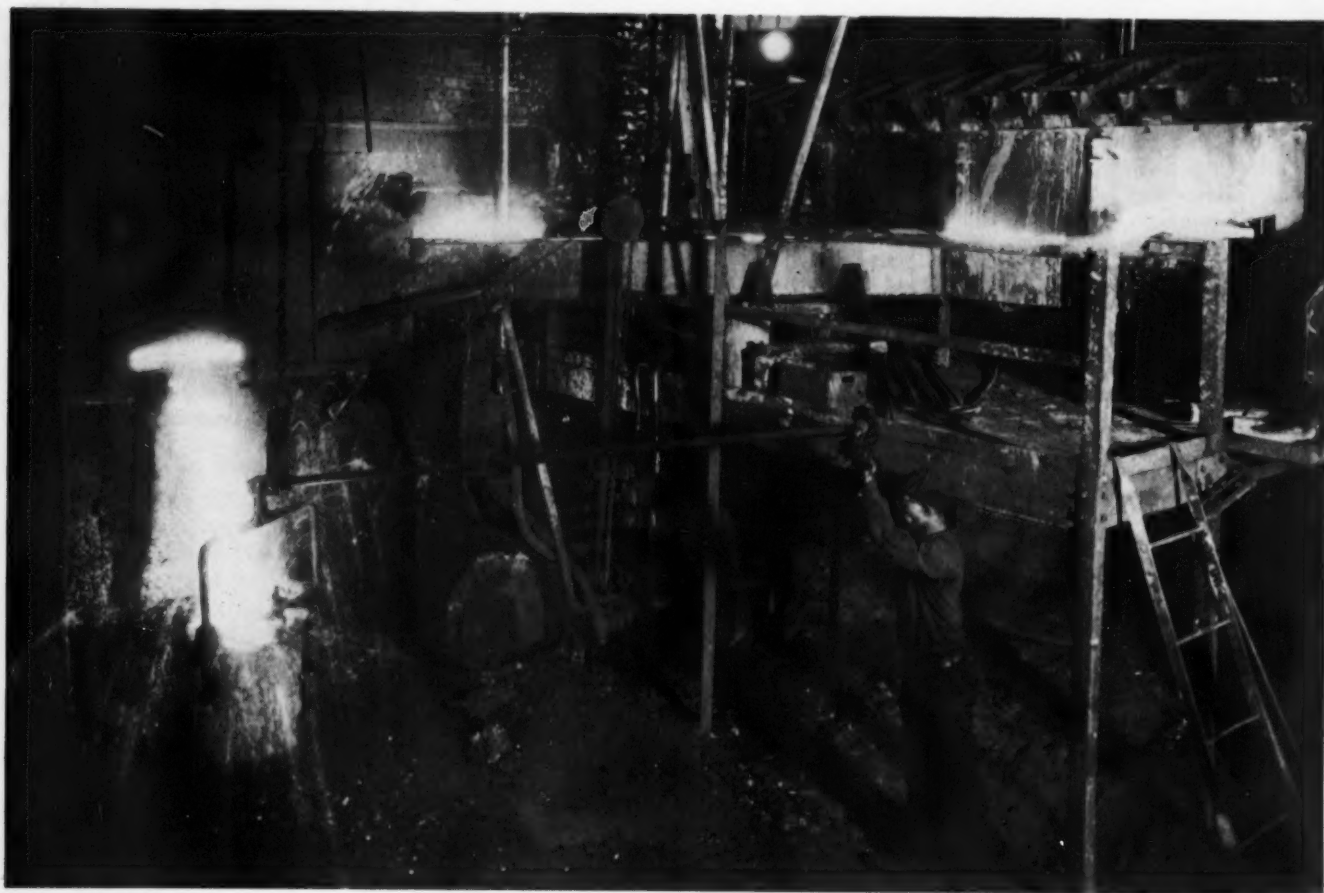
The stack is of conventional design except for an opening in its side through which is drawn that part of the waste gas which is used in the air preheater. A motor driven fan is used to overcome resistance in the heater. A duct from the heater leads to a fan located near the coal pulver-





PULVERIZED fuel mixed with preheated air enters the furnace through two burners.

THIS is a continuous process. Iron tapped from the furnace flows through a trough to a bull ladle.





izer. Part of the hot air is drawn through the fuel pulverizer for its scavenging action. The air laden with pulverized coal leaves the pulverizer and is mixed with the additional preheated air needed for combustion and the mixture is sent on its way to the two burners on the air furnace. The rate of fuel preparation and the mixture of fuel and air are under manual control. No additional air is admitted to the furnace at the burners. The fuel used comes from Eastern Kentucky. Its analysis is approximately 14,400 B.t.u., 4 per cent ash, 35 per cent volatile matter and 1½ per cent moisture.

Temperatures are as follows: iron at cupola spout 2700 deg. F.; iron at air furnace inlet 2650 deg.; iron at air furnace tap holes 2850 deg.; and air blast 350 deg. Temperature of iron poured into wheel molds is 2570 deg. F. Temperature of waste gas entering preheater 1220 deg.

Iron melted in the cupola is conveyed to the furnace by continuous tap and slightly more than one hour is required to fill the furnace after which it is continuously tapped at the rate of 28 tons an hour. This means that the iron remains in the furnace one hour during which time its temperature is raised 200 deg. to 2850 deg. F. The total carbon is slightly reduced (20 to 30 points) and any desirable modification of analysis can be made. There is practically no silicon loss in the air furnace. The combined silicon loss is 16 per cent.

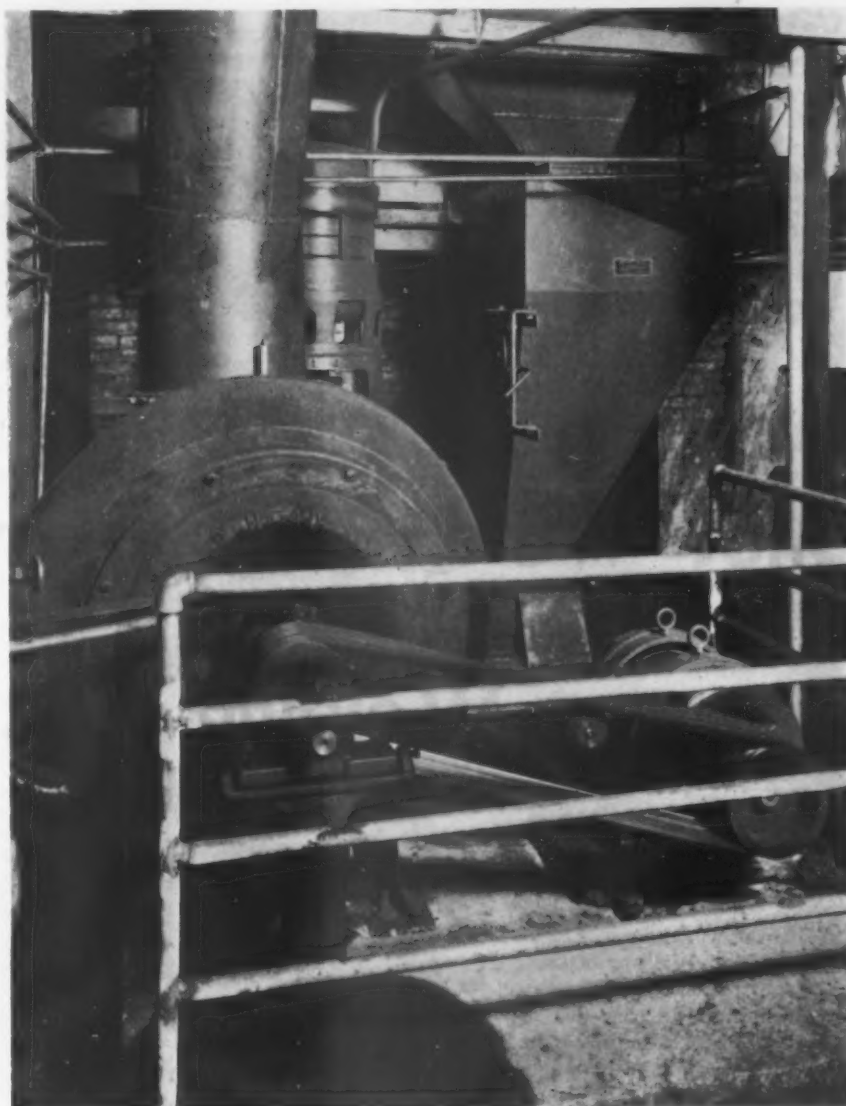
The two-fold purpose of the air furnace is complete control of the temperature of the molten iron to in-

sure liquefaction of the carbon in the iron, and secondly, to completely control the percentage of total carbon in the iron at a predetermined amount, which cannot be done in ordinary cupola practice.

The 30-ton air furnace and pulver-

simply resetting a control this fineness can be changed so that only 35 per cent will go through the same screen. The air preheater was built by the Air Preheater Corpn., Wells-ville, N. Y.

Fuel consumption on this unit over



Coal drops from an overhead bunker to the pulverizer where it is mixed with preheated air. Pulverized coal is not stored.

#### Record of Fuel Consumption

	Lb.
Cupola—Coke	
Bed .....	4,400
First charge of coke.....	1,100
Total .....	5,500
Coke between iron charges 950 lb.	
Air Furnace—Coal	
For preheating furnace to time of first tap, 2 hr. at 2000 lb..	4,000
For preheating iron, 6 hr. 30 min. at 1500 lb.....	9,750
Total .....	13,750
Fuel Consumed Per Ton of Iron Melted—	
Cupola—coke .....	124
Bed and preheating cupola....	25
Total .....	149
Air Furnace—Coal	
For refining.....	50
For preheating furnace.....	22
Total .....	72
Grand total (149 plus 72).....	221

ized coal firing equipment were furnished by Whiting Corpn., Harvey, Ill. The firing equipment consists of a Whiting air separation, impact type pulverizer, a cast iron Clarage exhaustor for furnishing combustion air, and special pulverized coal burners with water cooled nozzles. This is a direct fired unit in which the coal is blown directly into the furnace immediately after pulverization. It uses air which is heated to a temperature of 350 deg. F. With this new development it is possible to grind coal so fine that 98 per cent will pass through a 200 mesh screen, and by

a period of 10 days and a melt of 1800 tons averaged 73.2 lb. of coal per ton of metal melted. Taking into consideration the complete unit, that is cupola and air furnace, there are available the accompanying records of fuel required for melting and refining 180 tons of iron.

Results heretofore attained in melting iron from cold stock in an air furnace require from 700 to 800 lb. of powdered coal per ton of iron melted. The Griffin duplex installation therefore makes a decided advance in the economy of fuel for melting and refining iron.



# Shot Weld—A Closely Controlled Welding Process

**A**LL the world has heard of "shot weld" and its application in the fabrication of stainless steel for light weight railroad cars, truck bodies, aircraft structures and ship parts. To the layman it implies, perhaps, a mysterious new method of welding. It is a high speed spot welding operation according to a new method which produces, in the material being welded, certain desirable metallurgical and physical characteristics. As applied to austenitic stainless steel it produces strong ductile welds having good fatigue values, leaving the entire structure free from deleterious carbide precipitation. Its application to date has been largely in the chrome nickel group of stainless steels.

While the control of spot welding is a very desirable procedure, ordinarily, a wide range in the variables is permissible, and this latitude will not materially affect the quality of the resultant weld. For example, in welding ordinary mild steel it is entirely feasible to use lower currents pro-

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By **W. SPRARAGEN**

President, Spraragen Engineering  
Corp., New York

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viding the time of welding is correspondingly greater. According to the new method, on the other hand, in corrosion-resisting steel and particularly in the so-called 18-8 group, the reverse of this is true. Here every element is controlled within narrow ranges in order to obtain the results at which the method is aimed.

## Duration of Welding Cycle

In welding stainless steels by the resistance method, the duration of the welding cycle is not any longer than necessary and not so long that a critical zone is formed next to the weld, which may later result in intergranular corrosion. The time cycle of the

"shot weld" varies from  $\frac{1}{2}$  to 18 cycles of a 60-cycle current, depending upon the thickness of the material and the size of the spots.

*FRT* in general represents the controlling elements although, of course, there are other variables which directly or indirectly affect each of these items and, in turn, the quality of the weld. For example, the amount of current, *I*, would be dependent on the thickness of the material and the diameter of the electrode used. It might, in some cases, be affected by the capacity of the machines doing the work. *R*, which represents the resistance, would be dependent on the thickness of the material, the number of thicknesses placed together, the size of the electrodes and the mechanical pressure. Again, it would be dependent upon the proximity of completed spots. *T* represents the number of cycles, which, as stated above, varies from  $\frac{1}{2}$  to 18. A little later on there are given some actual values which are used in practice.

In order that the spot shall repre-

sent a balance in strength between its shear value and the strength necessary to tear the spot out of the material, a diameter of electrode is usually selected of four times the thickness of the plate. The tip is somewhat rounded. If too large an electrode is selected, there is a tendency for arcing action to continue until the tip of the electrode has been worn or built up to approximately the diameter indicated above.

One would probably expect that because of the high resistivity of stainless steel and its relatively low specific heat, currents would be used of a value 25 per cent less than that used in welding of ordinary steel of the same thickness. On the contrary the welding current is very much greater indeed, but applied for a very short time only.

#### Control Apparatus Set Frequently

To the layman control may appear somewhat complicated and apparently difficult to keep within the required limits. Actually, the control is set so as to produce a weld which has maximum shear and ductility values and which meets certain metallurgical requirements. The shearing strength is actually determined by pulling a

**L**IGHT weight construction today means usually the wise use of superior materials. Among such are the corrosion-resisting steels. They allow for reduced weights because of increased strength. In building passenger cars of the stainless steels, the material is used in part in strip form, and in the assembling spot welding under notably close control is employed. On this so-called shot-welding process Mr. Spraragen here supplies some facts and figures.

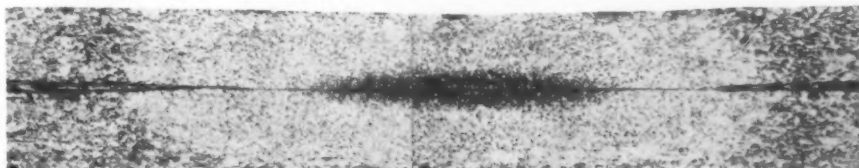
specimen and the ductility by a twist test. The weld penetration is actually determined by examining an etched section under the microscope. If more than two thicknesses of material are to be joined the weld penetration is from 50 to 70 per cent of the thickness of the outer plates. If, as is usually the case, two thicknesses are joined by a spot, the weld penetration in both plates is from 50 to 70 per cent of the thickness of the plate. If it is more than this amount, the heat of the welding will destroy certain desired properties in the stainless steel.

If it is less than this amount, the shearing and fatigue values are not likely to be all that are required.

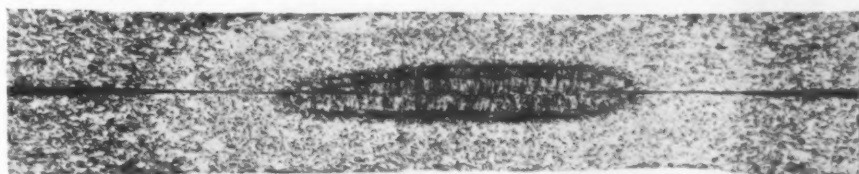
Should these test specimens not come within the required range, adjustment in current or pressure is made or the electrode is trimmed down more carefully. If the specimens meet the metallurgical and physical requirements the machine is set.

The control mechanism used in the Budd plant is mounted in a box as shown in the accompanying illustration and a record is made of each spot. A synchronous motor with a suitable gear ratio drives the electrical and mechanical control for the timing cycle. Adjusting taps in the primary of the welding transformer control the welding voltage and hence the welding current under the given conditions. The result is indicated by a line drawn on a roll of paper. The line must fall within two vertical lines provided on the paper. Should it fall on either side, a bell rings automatically and the operator or inspector knows that a significant change has taken place in the welding conditions requiring a readjustment of the equipment to continue making satisfactory welds. This change as well as the original setting is de-

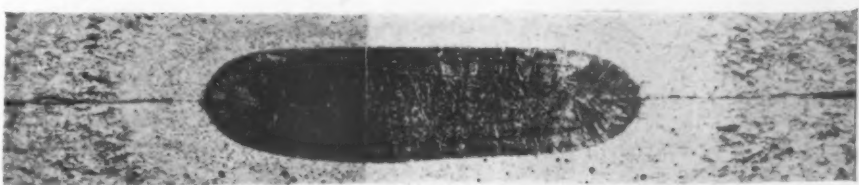
#### Welds in Stainless Steels of 0.012-in. Thickness Strips



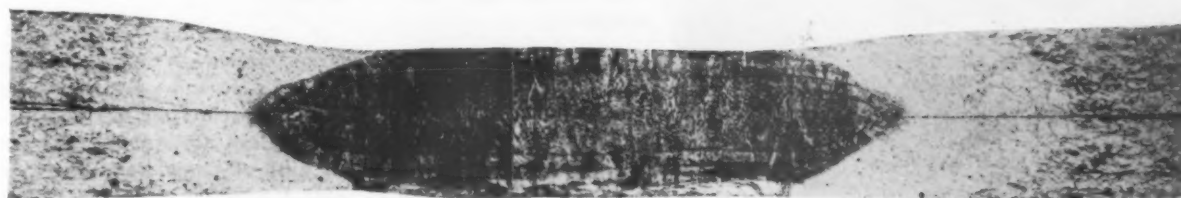
Insufficient fusion, giving a semi-fused weld.



Insufficient fusion, or cold weld.

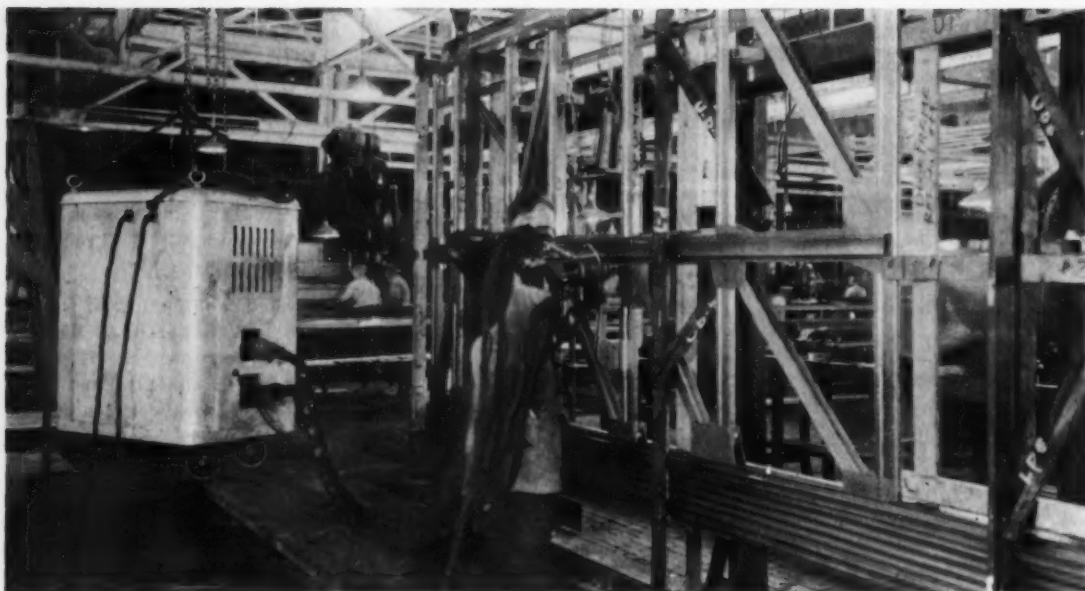


Shot weld with correct fusion.



Overheated weld, a case of too much fusion.





Stainless steel members are fabricated by the Budd shot-weld process. Side frame unit being assembled.

terminated by physical and metallurgical tests indicated above.

Of course, this device cannot directly record a change in mechanical pressure applied to the electrodes, but the change would affect the resistance, which in turn would affect the amount of current and this of course is recorded.

When intelligently used this recorder and signalling apparatus insure the predetermined quality of

each spot. This is highly important in many structures such as aircraft parts where the strength of important joints is dependent upon single welds.

#### Shot Welding of Stainless Steels

This shot-welding method greatly expands the fields of use of stainless steels. The applications have been applied in a wide range in the case of the austenitic nickel-chromium alloy steels, those of 150,000 to 200,000 lb. per sq. in. tensile strength, or the so-called 18 and 8 with carbon below 0.16 per cent.

By reason of their attainable strength and resistance to corrosion, these steels lend themselves admirably to structural uses and especially in structures which are exposed to the weather or subjected to considerable vibrations, and more especially where great strength with minimum weight is an important factor, as in aircraft structures. These steels also have the valuable property for some structural uses of being substantially non-magnetic.

The resistance welding of this cold worked steel by ordinary means is hazardous for the following reasons: First, because the steel is annealed when air

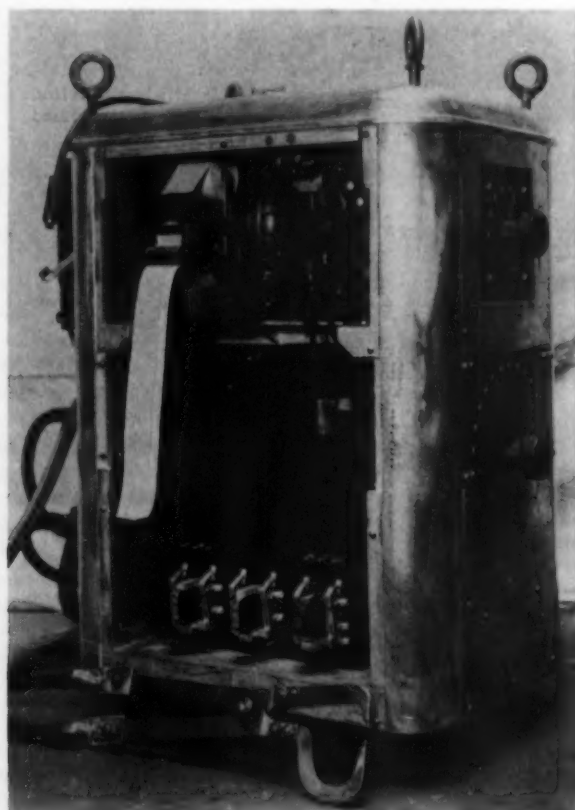
cooled from a temperature below its melting point. If too much of the area of the steel is allowed to become annealed it weakens the structure at the joined areas. Secondly, because there is a temperature range within which, if the steel is allowed to remain there for an appreciable time, carbide precipitation will occur. This carbide precipitation will result in destroying the resistance of the metal to corrosion as well as its homogeneity. These latter features are true as to both the cold worked and the annealed stock.

Annealed 18-8 stock, which has an ultimate tensile strength of 90,000 lb. per sq. in., will be subjected to carbide precipitation if heated within the range of 1100 to 1400 deg. F. for an appreciable length of time, and intergranular corrosion will follow. In the ordinary spot weld process, some of the metal surrounding each weld is subject to this attack.

#### Necessity for Careful Control

The electrical resistivity of the 18-8 stainless steel group is about six to ten times that of carbon steel. There is also the added difficulty of a much lower heat conductivity and a larger coefficient of expansion than with ordinary mild steel. All of this requires careful control of the welding heat to prevent too long a dwell in the undesirable temperature range of the metal.

A shot weld aims to utilize very large welding currents in a small fraction of a second. By taking into account the relatively low melting point of stainless steel (about 2500 deg. F.), its high electrical resistance, its poor heat conductivity and the fluidity immediately upon fusion, the weld may



The control mechanism is mounted in a box and a record made of each spot.

be made in a brief period of time in such a way that the desirable characteristics of the metal are not impaired. Tests have actually shown that with welds made in this way the over-lapped welded portions of the metal possess substantially the same strength and anti-corrosion characteristics as the metal remote from such portions.

Stating the matter in another way, the welding operation should be carried out in such a manner as to insure a steep heat gradient in the metal both on the rise of temperature and on the fall of temperature. In this way the heat which has a deleterious effect upon the steel is limited both in degree and time of application, or amount to not substantially more than necessary to effect the weld, and therefore it will have a minimum effect in impairing the desirable characteristics of the metal. A rapid rate of introduction of the heat, i. e., the steep heat gradient on the rise, will be effected by utilizing the relatively large currents for the brief period of time, and the rapid fall of temperature, i. e., the steep down gradient, will be effected both by the rapid introduction of the heat and by utilizing not substantially more heat or energy than necessary to properly weld the metal, thus enabling the metal to be more quickly quenched by the conduction of the surrounding cool metal and the electrodes. The electrodes may be water cooled if desired. If the heat is relatively slowly introduced the metal surrounding the weld would not remain cool and would therefore be less effective in quenching the metal of the welded zone. Also, other factors being the same, the more heat or energy put into the weld the more time required to quench the metal.

Deleterious effects resulting from the introduction of an excess of heat or undue dwell of the heat may take place without being detected from the mere appearance of the welded zone. They may only be discovered by microscopic examination or by tests for strength and corrosion, so it is important to regulate properly and accurately both the amount of current and the time of application thereof to insure uniform and reliable welds.

Pressures used in spot welding of the stainless steels are necessarily very much higher than for the same thickness of carbon steel. The plates are of course much stiffer and these high pressures are necessary to insure good point contact. Although the metal has not been molten for more than 80 per cent of its thickness, some discoloration is visible at the small

CURRENT REQUIREMENTS FOR DIFFERENT GAGE MATERIALS

	Example A	Example B	Example C
Gage—2 thicknesses, each, in.....	0.010	0.030	0.050
Diameter of electrode, in.....	3/16	%	%
Area of resulting weld, sq. in.....	0.00165	0.0143	0.0143
Total electrode pressure, lb.....	75	500	500
Welding time, sec.....	0.0083	0.0583	0.0833
Welding current, amp.....	1,472	4,415	4,270
Current density in welded area, amp. per sq. in.	893,000	308,700	298,200

surface area where the electrodes have come in contact with the metal. This discoloration in no way affects the properties of the material.

The accompanying tabulation will illustrate some instances of the process applied to spot welding of cold-rolled austenitic stainless steel. The current values are given in terms of the density per square inch of area of the welds themselves (measured transversely of the direction of current flow). The sizes of the welds for given electrode diameters may be varied by varying the current density and time. The electrode sizes are varied largely to accord with the dimensions of the work being done, e.g., thickness of gage, stiffness and relative alinement of parts, pressure needed to draw them together, accessibility to the spot to be welded, etc. In the welding of stock from 0.008 to 1/16 in. the diameters of electrodes

have varied from about 3/16 to about 1/2 in.

The weld areas were measured microscopically after sectioning, polishing and etching.

An Application in Light Weight Cars

Through the use of shot welding of stainless steel it has been possible to build a car of the weight of 250 lb. per passenger. A good example of this is the Budd built and General Electric equipped five-section car for the Brooklyn-Manhattan transit company. But the weight saving by mere weight reduction is not to be confused with true light-weight construction. The first accomplishes the end at a sacrifice of strength and security; the latter, by proper portioning of loads to materials, can actually increase the factor of safety after a very substantial lessening of weight. This involves an effective use of superior materials.

MIDDLEMAN between mountain of ore and mechanization is the open hearth from which comes the preponderant share of America's steel. So true is this that the state of business throughout our country can be roughly but surely measured by the reflections from these hearth fires. As the blast furnace typifies iron, so the open hearth typifies steel.





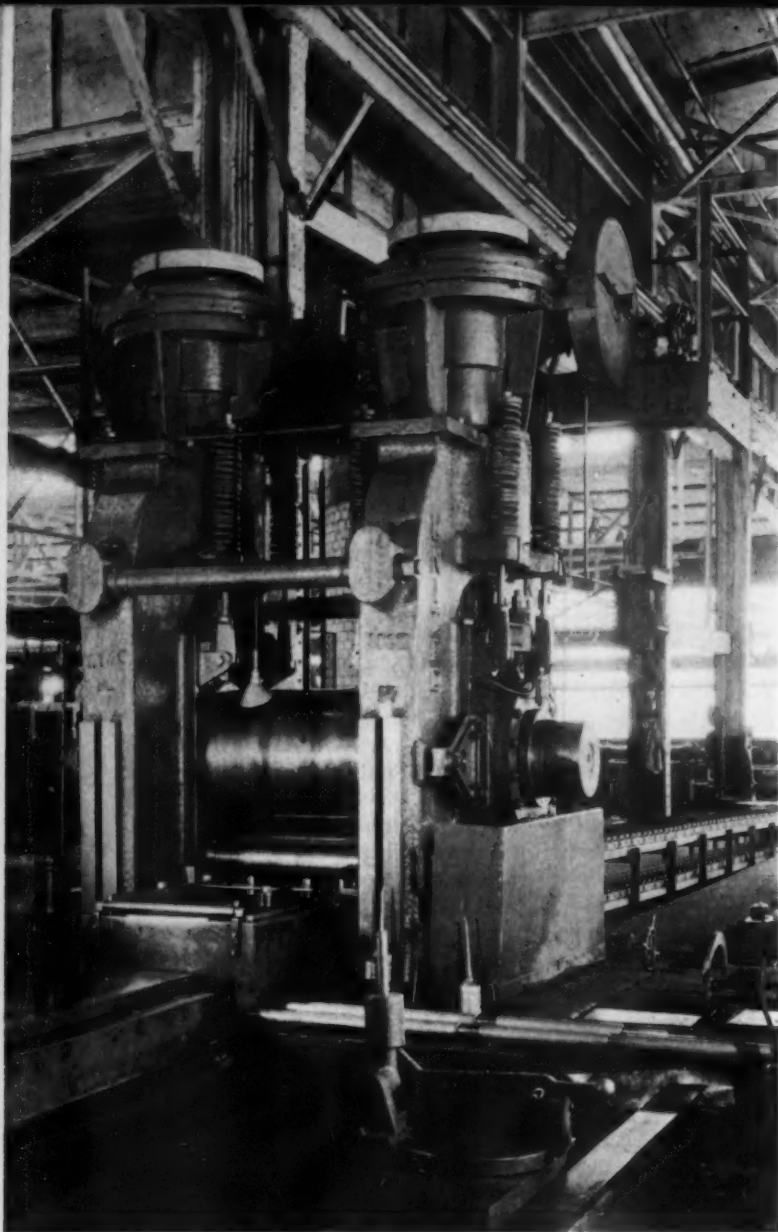


Fig. 2—Annealing and overhauling follow the break-down after which the bars are delivered by crane to the 4-high mill shown in this picture.

**A** NEW rolling mill recently installed by the American Brass Co. at its Canadian plant, Anaconda American Brass Ltd., New Toronto, Ontario, is decidedly novel both as to methods employed and equipment used. Following somewhat the practice instituted by Hirsch in Germany and Imperial Chemical Industries Ltd. in England, this mill is designed for rolling strips of much greater weight than have heretofore been rolled in American brass mills.

The weight of the slabs is such that a furnace charge of 850 pounds will fill either one or two molds, while the width of slab is determined by adding together the width of the narrowest and widest bars previously rolled in single strips by any particular mill.

In the Canadian mill described, a standard width of 18½ in. has been adopted, being a combination of 3 in. and 15 in., and it will be readily understood that this slab will produce a 4 in. and 14 in. strip, a 6 in. and 12

in. strip, or any other desired combination down to two 9 in. strips.

In using such a combination strip, the mill tickets are first sorted as to mixture and then sorted by widths, and, starting with the widest width the mill clerk orders from the casting shop a sufficient number of slabs to fill his wide metal orders, making note of the width and number of selvage strips resulting, and, after all orders for metal over 9 in. wide have been filled, the narrow metal orders are filled, using first the selvage strip and then an additional number of castings.

#### Use of Selvage Strips

As narrow metal orders always greatly exceed wide metal orders in American and Canadian mills, the selvage strips can always be used immediately if desired but in actual practice it is found preferable to keep a certain number of these strips in stock as they are most useful in filling small orders promptly, while

## Canadian Brass Ro

metal for narrow orders can be rolled in multiple widths with greater economy.

This practice has many advantages starting with the casting shop; the number and cost of molds is reduced to a minimum, it speeds production and shortens delivery because strips of any width can be taken from the selvage pile or slit off a wide bar without waiting for castings, it reduces end and slitter scrap materially and it greatly simplifies mill accounting as the weight of every bar is identical per inch of width and the length of every bar is the same at any specified gauge, regardless of its width.

While brass mixtures commonly used abroad permit hot rolling with economy, this is not always true in the United States and Canada and the new Canadian plant is equipped with both hot and cold breaking down mills for rolling strip metal from cake or casting down to 0.400 in., at which point it is overhauled and then cold rolled to finish.

#### The Hot Mill

The hot mill is of standard 2-high type with rolls 24 in. x 72 in. driven at a speed of 280 ft. per min. by a 500 hp. motor with flywheel. This mill is equipped with live roll lifting table in back, a motor driven edger mounted on a car to slide sideways into and out of position in front of the rolls, and a swinging conveyor table to convey cakes from the heating furnace to the left hand side of the rolls invariably used for the first heavy roughing passes or semi-finished strips to the edger and the right hand side of the rolls reserved for finishing passes where good surface is necessary.

This mill is used principally for rolling copper, bronze and Everdur from cakes weighing 400 and 600 lb. to strips from 18 in. to 24 in. wide and serves both sheet rolls of stand-



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# Rolling Mill

By JAMES R. COE  
Mechanical Superintendent, American  
Brass Co.

## Represents Advanced Practice

ard type and the large 4-high strip mill to be later described.

### The Cold Rolling Mill

The cold mill contains many new features for handling heavy bars with a minimum of effort—which will be described in detail, while description of standard rolling and finishing equipment, familiar to all mill men, will be purposely omitted.

Starting from the casting shop, the slabs or bars are piled eight or ten high and carried by crane to a gating shear where the metal is inspected for surface and interior soundness.

This shear, of standard guillotine type, is equipped with a hydraulic elevator in front on which the bars are placed by crane, a pneumatic pusher engages the back of each bar in turn, and, as the elevator is raised to bring the top bar slightly above the shear table it is pushed first into shearing position and then back on to a roll table extending horizontally back from the shear, the gate end falling through a slot in this table into a scrap bucket.

At the rear end of this table is mounted a car designed to straddle a

ADVANCED practice in brass rolling is represented in the methods and equipment employed in the Canadian plant of the American Brass Co., Anaconda American Brass Ltd., New Toronto, Ont.

The mill is designed for rolling strips of much greater weight than have heretofore been rolled in American brass mills. Large economies have been secured through ingenious adaptations of English and German methods in combination with original developments by the American company's engineers.

heavy base and run back on slightly inclined tracks extending from the sides of the base. This car carries a single idle roll level with the roller table to support the front end of the bar and a bumper plate to engage the bar, forward motion of which pushes the car back up the slightly inclined tracks until the back end of the bar leaves the roller table when the front end slips off the idle roll and the bar falls horizontally on to

the base to form a new pile while the car returns by gravity to starting position.

The breaking-down mill for cold rolled metal is a standard type, 2-high mill driven at a constant speed of 112 ft. per min. by an 800 hp. motor.

This mill is equipped with a motor driven roller top elevator on which piled bars are loaded by crane and advanced by a pneumatic pusher until the pile abuts against an apron attached to the guide table in front of the mill. As the elevator is raised the top bar is pushed off the pile and into the rolls by the pusher, the front end of which carries a hinged slipper resting on the bar while the heel engages the back end of the bar.

Leaving the rolls the bars pass over a driven roller behind the rolls and fall on to a smooth top table where an operator merely sees that they pile properly, and after two piles of castings have been passed through the mill and stacked into one pile a pneumatic pusher pushes this pile sideways on to a car and against a bumper which aligns all the bars perfectly.

Fig. 1—The cold breaking-down mill is of 2-high type and runs at 112 ft. per min. Pneumatic pushers load the rolls from slab stacks and also pile rolled bars into delivery cars.



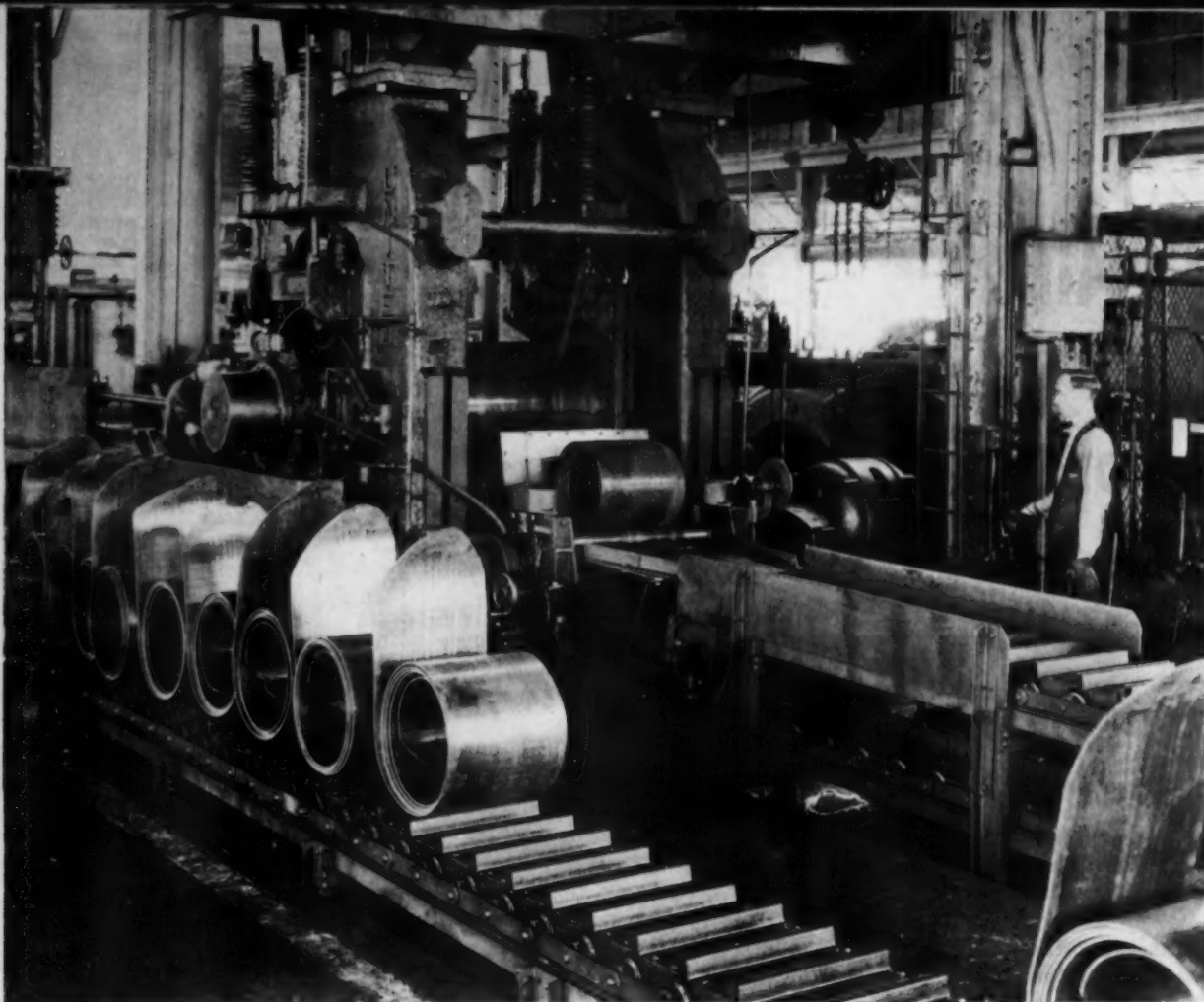


Fig. 3—The first pass of the bars through the 4-high mill results in a flat strip which is coiled on a standard roll coiler. The coils are ejected onto a conveyor which provides storage for 25 coils.

The car is then transferred to a position in front of the rolls between the elevator and a second pusher

which again transfers the bars sideways to the elevator in lowered position. After two or three piles have

Fig. 4—At the rear of the coil conveyor from the 4-high mill, the coils are transferred sideways to a return conveyor for the second pass. During the transfer, the end of each coil is opened by the transfer operator.



been passed through the mill, the rolls are adjusted for the next pass and this entire operation is repeated until the bars have been reduced from  $2\frac{1}{2}$  in. thickness to 0.400 in., seven passes and one anneal being required.

#### Annealing Furnace

Leaving the breaking-down mill at one inch thick and 0.400 in. thick the bars are placed by crane on annealing pans and passed through a narrow tunnel type furnace in which one chamber is heated by oil burners while a preceding chamber is heated by waste gases from the first mentioned chamber.

Leaving the furnace the bars pass through a cooling chamber in which is mounted a large number of nozzles through which water is sprayed against the metal, which water is immediately transformed into steam and the metal cooling in this atmosphere is practically bright and requires no cleaning.

After the second annealing operation the bars are passed twice through a milling type overhauling machine in which about 0.010 in. is removed from one surface at each pass. This milling operation is always performed on the lower side of the bar in order that chips will fall away from the cutter and not be rolled into the surface of the metal by the powerful

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feed rolls necessary to pull wide metal through the machine.

After overhauling, the bars are inspected for perfect surface and then are delivered by crane to the big 4-high mill.

### The Big Mill

This mill is a 14 in.-32 in. x 48 in. mill driven at a constant speed of 200 ft. per min. by a 750 hp. motor. In front of the mill is located first a motor operated roller top elevator and a pneumatic pusher similar to that on the breaking-down mill and, second, a special guide table and sticker for coiled metal.

The elevator and pusher are used for the first pass of flat metal which, passing through the rolls is coiled on a standard 3-roll coiler with pneumatic ejector which delivers it on to a motor driven conveyor running straight back a sufficient distance to provide storage room for 25 coils 22 in. in diameter.

At the rear end of this conveyor, coils are transferred sideways on to a second return conveyor passing through an opening machine where an operator rotates the coil until the end is on top, clamps the coil against rotation and then pulls out the tail end and irons this end down over a wooden form of such shape that the end when released will project tangentially from the coil a sufficient distance to permit sticking the same into the rolls or splitter.

After straightening, the coils are transferred back to a position in front of and slightly to one side of the rolls where another operator sees that the end is standing upright and then pushes the coil sideways into the coil sticking machine.

This machine consists of two cars connected by drag rods permanently fastened to one car and sliding through lugs on a second car in such a manner that forward and backward motion of the first car by a pneumatic cylinder will cause the second car nearest the rolls to move only half the distance. The first car designed to straddle the elevator in lowered position carries side guides for flat metal and a removable brass covered wooden peg when coiled metal is being rolled. The second car carries a short side guide table and a horn on to which a coil of metal is pushed when the first car and peg are pulled away back and the second car part way back.

When rolling flat metal, first pass, the peg is removed and both tables are pushed forward forming a stationary guide for the metal in front

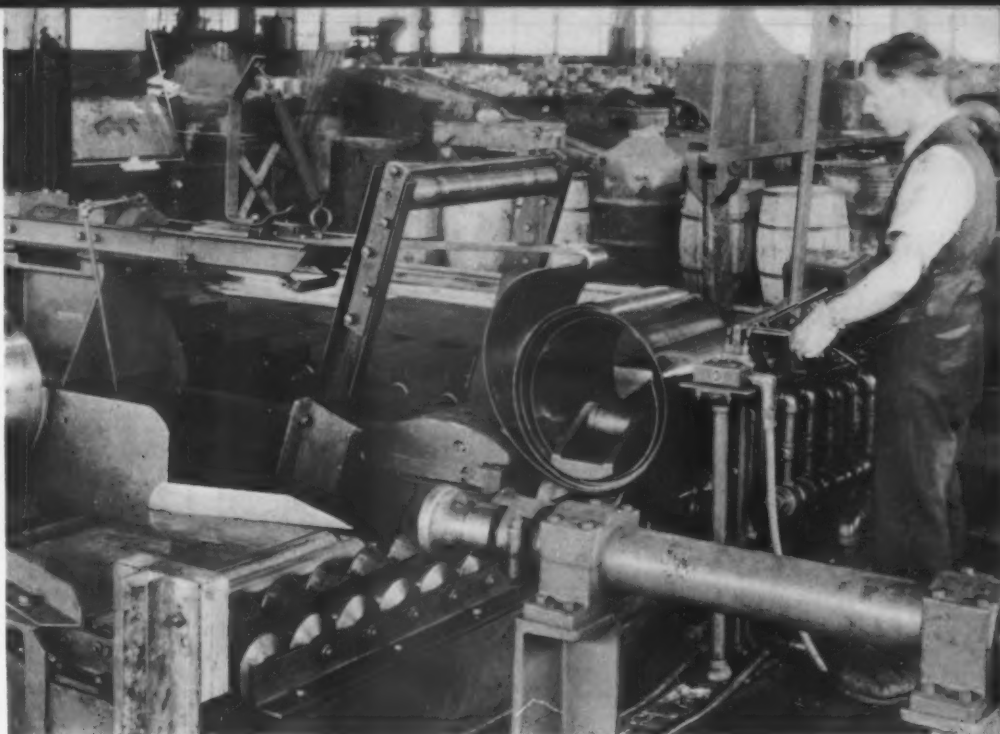


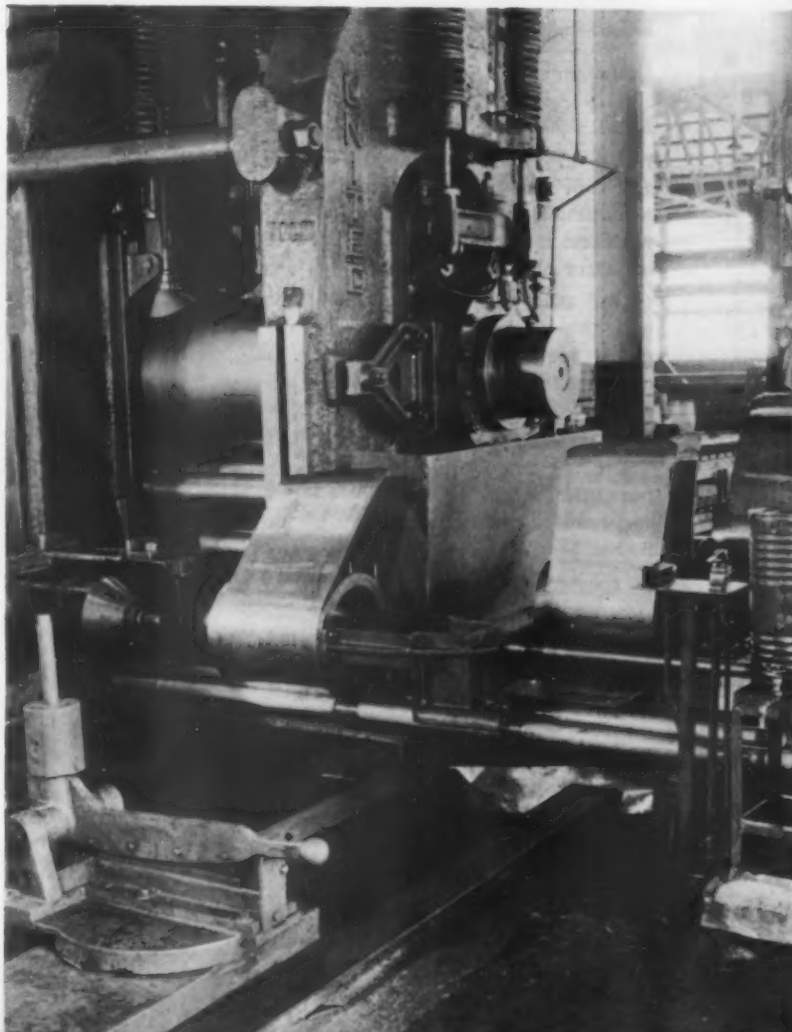
Fig. 5—This is a "close up" of the transfer station, at which the opening machine is located. Here the coil is pneumatically clamped and its end straightened tangentially by a piston operated puller.

of the elevator and when rolling coiled metal, with the elevator in lowered position, forward motion of the first car with peg in position first turns the end down into horizontal position between side guides of the second car and then pushes the second car and metal into the rolls, the peg passing under an idle roller

mounted between the roll housings to hold the metal and force it into the rolls, at which time the ends of the shaft supporting the horn engage heavy bearings on the roll housing and prevent the coil being pulled into the rolls.

To eliminate frequent changes in roll adjustment, metal is preferably

Fig. 6—At the return end of the conveyor, the opened coils are transferred to the coil sticking machine bobbin.





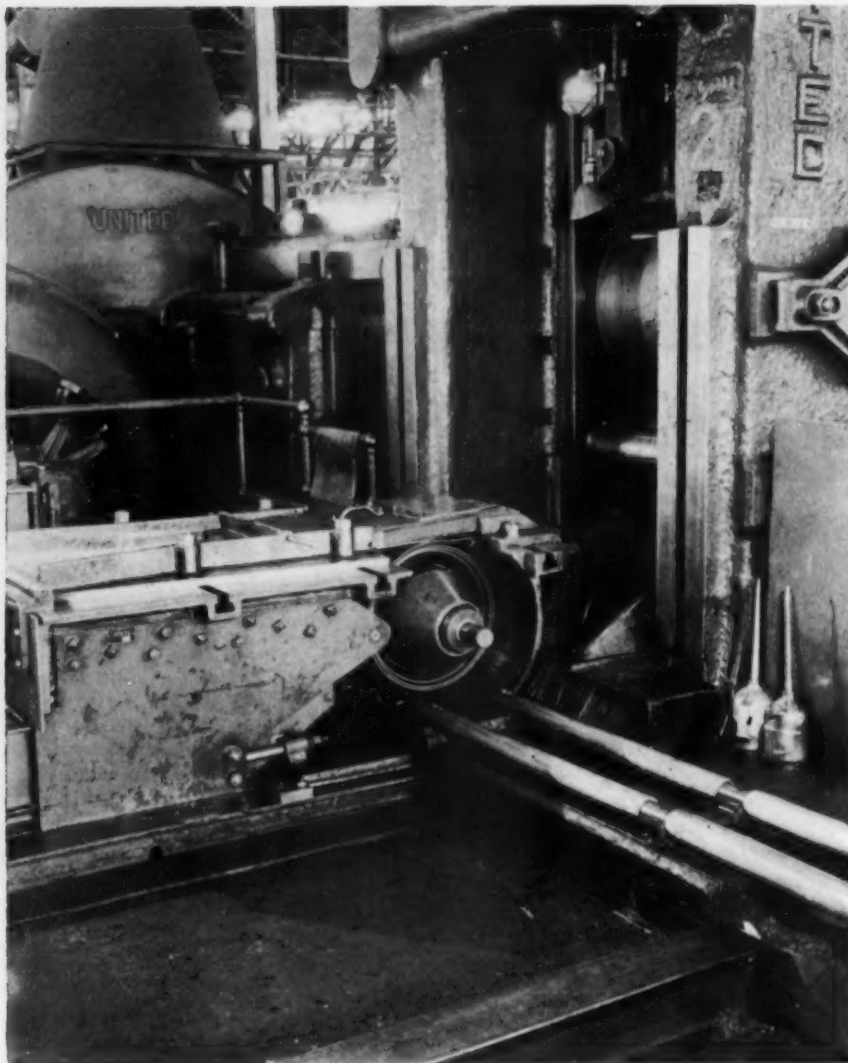


Fig. 7—The carriage of the coil sticking machine is next advanced, entering the coil end into the rolls for the second pass.

rolled in batches of about 50 bars and four passes are required to effect a reduction from 0.380 in. to 0.060 in. with one intermediate anneal at 0.180 in. after the second pass.

One man operates the screwdown and the sticker while another man gages metal, adjusts the coiler and operates the ejector, and, with a total crew of four men production on this mill averages 11,000 lb. per hour.

Leaving the mill after the second pass, the metal is transferred sideways on a gravity conveyor of sufficient length to store 50 coils to a tilting table where coils are upended and loaded on pans for transfer to a second tunnel type annealing furnace exactly duplicate of that previously described, through which furnace they return to the coil opener and mill for further rolling.

After second rolling on the big 4-high mill, the coils pass to a trimmer where a small selvage is removed from each edge to insure uniform

width essential for rolling thin metal at high speed, and, after a second anneal in the coil furnace, they are transferred to a second 4-high mill.

This mill with rolls 8½ in.-24 in. x 26 in. is driven by a 250 hp. variable speed motor which operates the mill through push button control at any desired speed between 0 and 700 ft. per min.

This mill is equipped with conveyors similar to the large mill but the metal delivered to it in coil form is wound after each rolling on large heavy flanged spools which protect surface and edge from damage of any kind.

These spools, weighing themselves about 250 lb., are placed on to a winding drum mounted behind the mill and driven from the mill through a friction drive adjustable to provide any desired tension. Pins on the inside of the spools engage with slots in the drum surface and the metal leaving the rolls is wrapped around the spool by a pair of hinged arms geared together in such manner that they close and open simultaneously to completely encircle the spools or completely clear them after a few layers of metal have been wrapped when frictional contact will prevent any slippage between metal and spool. As the last end of a coil leaves the rolls an operator snaps a leather lined spring steel clip over the coil to prevent unwinding and then a little motor operated car moves forward, a hook carried by this car engages the spool and backward movement of the car draws the spool off the drum and



Fig. 9—Another transfer station is located at the delivery end of the conveyor from the smaller 4-high mill. After inspection, the coils are transferred to a slitter to be trimmed to width.

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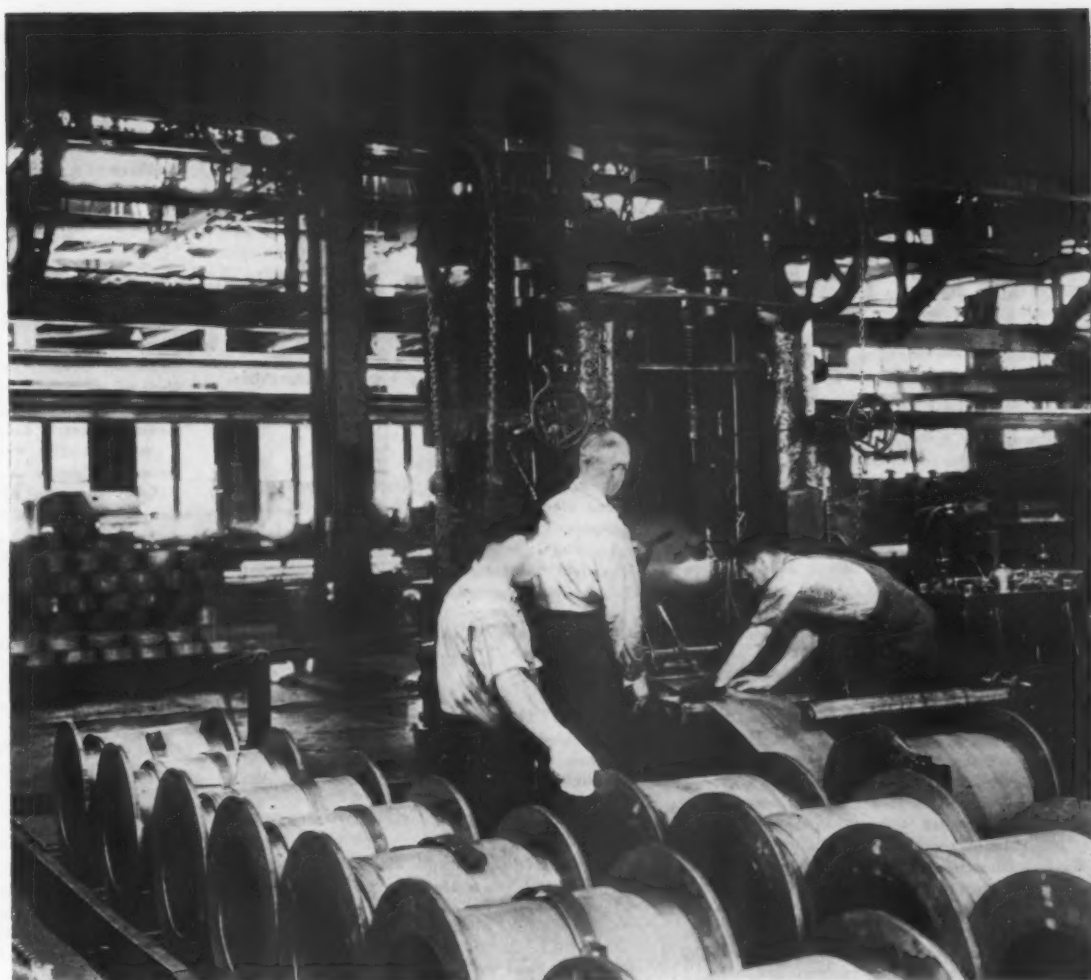
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Fig. 8—After the second rolling on the big mill comes another annealing, a selvage trimming and then the coils go to the smaller 4-high mill shown in this illustration. The metal delivered from this mill is coiled on flanged spools.

▼ ▼ ▼



back to a position in front of one conveyor where the car is tilted to discharge the spool and returns to a stop position in front of a second conveyor where it receives an empty spool for placement on the winding drum.

At the rear end of the conveyors, is located another transfer car where an operator inspects and trims off

any ragged ends, and after metal is passed through the mill for the last time this operator unwinds it from the spools on to a collapsible drum from which an air operated ejector pushes each coil down a gravity conveyor to a second slitter where it is trimmed or slit to desired width.

On this mill the metal is reduced from 0.060 in. to 0.015 in. in four

passes when extremely small variation in gage is not required, and with rolling speeds gradually increased from 400 ft. to 700 ft. per min. the mill will produce 5,000 lb. per hour. When extremely accurate gage is required, the metal is given one or two additional passes for this reduction and with these extra passes

(Concluded on Page 79)

**M**ANKIND, through metallurgy, owes a tremendous debt to heat. Particularly are we obligated for the refinements of heat production and control which have enlarged the horizons of quality. Foremost among the developments in this category have been those associated with the electric furnace. These have given us processes and products that we might not have known otherwise.



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**Ajax Electrothermic Corp.**, Booth 374. Melting furnaces.

**Allegheny Steel Co.**, Booth 241. Stainless and heat resisting steels; alloy steels; sheet steel.

**Edgar Allen Steel Co., Inc.**, Booth 332. Alloy steels; tool steels; strip steel.

**American Brass Co.**, Booth 301. Welding rods; copper products.

**American Electric Furnace Co.**, Booth 345 and Gas Section. Heat treating furnaces (electric, gas, and oil).

**American Gas Association**, Booth, Gas Section. Industrial gas equipment.

**American Gas Furnace Co.**, Booth, Gas Section. Heat treating furnaces; blowpipes and burners; retort carburizing furnaces; nitriding furnaces.

**American Metal Market**, Booth 262. Publications.

**American Sheet & Tin Plate Co.**, Booth 142. Steel sheet.

**American Steel & Wire Co.**, Booth 142. Welding wire; stainless and heat resisting steels; alloy steels; strip steel; cold finished bars.

**Aurora Metal Co.**, Booth 431. Die castings.

... B ...

**Babcock & Wilcox Co.**, Booth 273. Refractories.

**Baldwin-Southwark Corp.**, Booth 333. Testing machines of all types.

**Bastian-Blessing Co.**, Booth 325. Welding and cutting torches; regulators; oxygen and acetylene manifolds; acetylene generators.

**Bausch & Lomb Optical Co.**, Booth 350. Metallurgical microscopes; spectrograph; optical and measuring instruments.

**Bellis Heat Treating Co.**, Booth 460. Furnaces and salts.

**Bethlehem Steel Co.**, Booth 166. Alloy steel; structural shapes; stainless and heat resisting steel; tool steel; bolts and nuts.

**G. S. Blakeslee & Co.**, Booth 287. Metal washing and cleaning machines.

**H. Boker & Co., Inc.**, Booth 121. Stainless steels; tool steels; alloy steels.

**Botfield Refractories Co.**, Booth 231. High temperature fire brick cement; refractory materials.

**Bristol Co.**, Booth 362. Pyrometers; thermocouples; automatic temperature control equipment.



**Brown Instrument Co.**, Booth 145. Pyrometers; thermocouples.

**Brown-Wales Co.**, Booth 269. Tool steels; high speed steels; finishing steels; die steels; structural steels.

... C ...

**Carboloy Co., Inc.**, Booth 370. Cemented carbide tools and dies.

**Carborundum Co.**, Booths 306 and 310. Abrasives; grinding and cutting wheels; polishing grains; refractory products; pyrometer tubes.

**Carnegie Steel Co.**, Booth 142. Alloy steel; structural shapes; stainless and heat resisting steels; sheet and strip products.

**Chapman Valve Mfg. Co.**, Booth 472. Heat treating process.

**Chemical Catalog Co.**, Booth 461. Publications.

**Climax Molybdenum Co.**, Booth 114. Chemical and metallurgical products of molybdenum.

**Cling-Surface Co.**, Booth 106. Belt dressing.

... D ...

**Dardelet Threadlock Corp.**, Booth 278. Threaded bolts and nuts.

**Delaney Chemical Co.**, Booth 459.

**Detroit Alloy Steel Co.**, Booth 390. Alloy steels.

**Dow Chemical Co.**, Booth 107. Magnesium alloys; metal cleaner.

**Driver-Harris Co.**, Booth 126. Heat and corrosion resisting alloys.

... E ...

**E. I. Du Pont de Nemours & Co. (R. & H. Chemicals Department)**, Booth 270. Heat treating salts; metallic sodium; plating salts and chemicals; metal cleaners.

**Electro Metallurgical Co.**, Booths 162 and 313. Ferroalloys.

**Ensign-Reynolds, Inc.**, Booth, Gas Section. Soft metal melting furnaces; gas compressors; burners; air blowers.

... F ...

**Ferrous Magnetic Corp.**, Booth 435. Magnetic inspection equipment.

**J. B. Ford Co.**, Booth 346. Metal cleaners.

**Forging & Casting Corp.**, Booth 448.

**Foxboro Co.**, Booth 242. Pyrometers; thermocouples; pyrometric instruments.

... G ...

**Gas Machinery Co.**, Booth, Gas Section. Furnaces; equipment for gas plants.

**Gathmann Engineering Co.**, Booth 115. Ingot molds.

**Gehrich Corp.**, Booth, Gas Section. Ovens.

**General Alloys Co.**, Booth 101. Heat and corrosion resisting alloys.

**General Electric Co.**, Booth 416. Electric furnaces; electric welding machines.

**General Electric X-Ray Corp.**, Booth 393. X-ray equipment for metallurgical testing.

**General Gas Light Co.**, Booth, Gas Section. Gas heaters.

**Globar Corp.**, Booth 306. High temperature heating elements.

**Globe Machine & Stamping Co.**, Booth 444. Tumbling barrels.

**Gogan Machine Corp.**, Booth 254. Hardness testing machines.

**Grasselli Chemical Co.**, Booth 109. Inhibitors; fluxes, acids; chemicals for cadmium and zinc plating.

**Great Lakes Steel Corp.**, Booth 366 and 379. Sheet steel; strip steel; alloy steel.

... H ...

**Harnischfeger Corp.**, Booth 488. Electric arc welders; electric motors.

**Hauck Manufacturing Co.**, Booth 267. Oil burners; regulating valves.

**C. I. Hayes, Inc.**, Booth 365. Electric heat treating furnaces.

**Haynes-Stellite Co.**, Booths 162 and 313. Cutting tools; welding rods.

**Heppenstall Co.**, Booth 382. Die blocks; alloy steels; shear blades; heavy forgings.

**Hevi Duty Electric Co.**, Booth 411. Electric heat treating furnaces.

**Hobart Brothers Co.**, Booth 105. Electric arc welders.

**Hollup Corp.**, Booth 381. Welding electrodes; electric arc welders.

**Charles A. Hones, Inc.**, Booth, Gas Section. Burners and appliances; furnaces for melting; bench furnaces; tank heaters.

**E. F. Houghton & Co.**, Booths 110 and 169. Carburizers; industrial oils; belting; heat treating salts; rust preventives; metal cleaners.

... I ...

**Illinois Steel Co.**, Booth 142. Alloy steels; stainless and heat resisting steels; sheets, wire and strips.

**Illinois Testing Laboratories, Inc.**, Booth 253. Pyrometers; resistance thermometers.

**International Nickel Co.**, Booth 130. Nickel and nickel alloys for steel, cast iron and non-ferrous alloys.

**IRON AGE**, Booth 261. Publications.

... J ...

**Jones & Laughlin Steel Corp.**, Booth 174. Hot and cold rolled steels; bessemer screw stock; S.A.E. steels.

... K ...

**Kelley-Koett Mfg. Co., Inc.**, Booth 173. X-ray equipment for metallurgical testing.

**C. M. Kemp Manufacturing Co.**, Booth, Gas Section. Gas premixers; lead melting units; burners.



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# Exposition



## ... L ...

**Leeds & Northrup Co.**, Booth 354. Heat treating furnaces; thermocouples; pyrometers.  
**E. Leitz, Inc.**, Booth 118. Metallurgical microscopes; optical instruments; grinding and polishing machines for metallurgical specimens.  
**Lincoln Electric Co.**, Booth 102. Electric welding machines (automatic and hand operated); welding supplies.  
**Linde Air Products Co.**, Booths 162 and 313. Welding and cutting apparatus; welding gases.

## ... M ...

**Machinery**, Booth 377. Publications.  
**Macklin Co.**, Booth 467. Grinding wheels.  
**Madison-Kipp Corp.**, Booth 423. Die casting machines; air tools and accessories.  
**Magnaflux Corp.**, Booth 330. Inspection method.  
**Magnetic Analysis Corp.**, Booth 331. Magnetic testing apparatus.  
**Manhattan Rubber Co.**, Booth 492. Wheels for grinding and finishing stainless steels and other materials.  
**Marburg Brothers, Inc.**, Booth 302. Cutting tools; die sawing and filing machines; measuring gages and devices; pneumatic hammers.  
**Maschinenfabrik Herborn**, Booth 455. Wire drawing machinery.  
**Mears-Kane-Ofeldt, Inc.**, Booth, Gas Section. Gas burners.  
**Metal & Thermit Corp.**, Booth 383. Thermit welding materials and equipment; welding wire.  
**Metals & Alloys**, Booth 461. Publications.  
**Lee B. Mettler Co.**, Booth, Gas Section. Gas burners.  
**Michigan Steel Casting Co.**, Booth 394. Heat and corrosion resisting castings.  
**Midvale Co.**, Booth 157. Forgings; rolls; tool steels; stainless and heat resisting steels.  
**Mill & Factory**, Booth 427. Publications.  
**A. Milne & Co.**, Booth 332. Alloy steels; strip steels; tool steels.  
**Minneapolis-Honeywell Regulator Co.**, Booth 255. Valves for industrial furnaces; automatic control systems; temperature and pressure control apparatus.  
**Molybdenum Corp. of America**, Booth 122. Molybdenum alloys and compounds; tungsten and tungsten compounds.  
**Monarch Engineering & Mfg. Co.**, Booth, Gas Section. Furnaces.  
**Morse Twist Drill & Machine Co.**, Booth 357. Drills; reamers; taps; dies; milling cutters.

## ... N ...

**National Carbon Co.**, Booths 162 and 313. Carbon electrodes; carbon products.  
**National Industrial Publishing Co.**, Booth 271. Publications.  
**National Tube Co.**, Booth 142. Tubes.  
**New Jersey Zinc Sales Co.**, Booths 314 and 318. Zinc and zinc alloys.  
**Norton Co.**, Booths 337 and 339. Grinding wheels; cutting wheels; refractories.

## ... O ...

**Oakite Products, Inc.**, Booth 369. Cleaning compounds.  
**Tinius Olsen Testing Machine Co.**, Booth 321. Testing machines of all types.

## ... P ...

**Page Steel & Wire Division**, Booth 475. Welding wire.

**Parker-Kalon Corp.**, Booths 412 and Gas Section. Furnaces and screw machine products.  
**Partlow Corp.**, Booths, Gas Section. Gas burners; thermostats.  
**Henry Pels & Co., Inc.**, Booth 464. Billet shears and cut-off machines.  
**Horace T. Potts Co.**, Booth 269. Tool steels; high speed steels; finishing steels; die steels; structural steels.  
**Pyrometer Instrument Co.**, Booth 440. Pyrometers.  
**R-S Products Corp.**, Booth, Gas Section. Furnaces.

## ... R ...

**Radium Preparations, Inc.**, Booth 419. Radium salts.  
**N. Ransohoff, Inc.**, Booth 291. Tumbling barrels; metal cleaning machinery.  
**Republic Steel Corp.**, Booth 133. Alloy steels; sheet and strip; stainless and corrosion resisting steels.  
**John A. Roebling's Sons Co.**, Booth 398. Welding wire; strip steel.

## ... S ...

**George Scherr Co., Inc.**, Booth 134. Precision measuring tools.  
**Selas Co.**, Booth, Gas Section. Premixing machines for gas and air; gas burners; soldering systems; gas heated molding platen.  
**Shore Instrument & Mfg. Co.**, Booth 480. Hardness testing instruments.  
**Sivyer Steel Castings Co.**, Booth 334. Steel castings; heat resisting castings.  
**Spencer Turbine Co.**, Booth 251. Air compressors.  
**Steel**, Booth 289. Publications.  
**Steel Publications, Inc.**, Booth 415. Publications.  
**Steel & Tubes, Inc.**, Booth 133. Tubes.  
**D. A. Stuart & Co.**, Booth 399. Industrial oils and greases.  
**Surface Combustion Corp.**, Booth, Gas Section. Heat treating furnaces.

## ... T ...

**C. J. Tagliabue Mfg. Co.**, Booth 283. Pyrometers; thermometers.  
**Testing Machines, Inc.**, Booth 358. Testing machines.  
**Textile Machine Works**, Booth 401. Wire drawing machinery.

**Titanium Alloy Mfg. Co.**, Booth 484. Ferroalloys; titanium alloys and compounds.  
**Triplex Machine Tool Corp.**, Booth 494. Special machines.

## ... U ...

**U S L Battery Corp.**, Booth 381. Electric arc welding machines.  
**Udylite Co.**, Booth 274. Chromium and cadmium plating.  
**Una Welding & Bonding Co.**, Booth 476. Electric arc welding machines.  
**Union Carbide & Carbon Corp.**, Booths 162 and 313. Welding and cutting apparatus; ferroalloys; carbon products; cutting tools; oxygen and acetylene.  
**United American Bosch Corp.**, Booth, Gas Section. Gas apparatus.  
**United States Steel Corp.**, Booth 142. Sheet and strip steel; stainless and heat resisting steels; tubes; structural steels; wire and wire products; alloy steels.

## ... V ...

**Vanadium Corp. of America**, Booth 335. Vanadium alloys and compounds.  
**Vapofier Corp.**, Booth 258. Oil burners.  
**Victor Saw Works, Inc.**, Booth 384. Molybdenum steel hack saws.

## ... W ...

**Waterbury Farrell Foundry & Machine Co.**, Booth 456. Wire drawing machinery.  
**Welding Engineer**, Booth 256. Publications.  
**Westinghouse Electric & Mfg. Co.**, Booths 436 and 479. Electric heat treating furnaces; electric welding machines.  
**Wheelock, Lovejoy & Co., Inc.**, Booth 386. Alloy machinery steels; tool steels; special steels.  
**Wickwire Spencer Steel Co.**, Booth 138. Wire and wire products; heat and corrosion resisting alloys.  
**Wilson Mechanical Instrument Co.**, Booth 326. Hardness testers.  
**Wilson Welder & Metals Co., Inc.**, Booth 378. Electric welding machines.

## ... Y ...

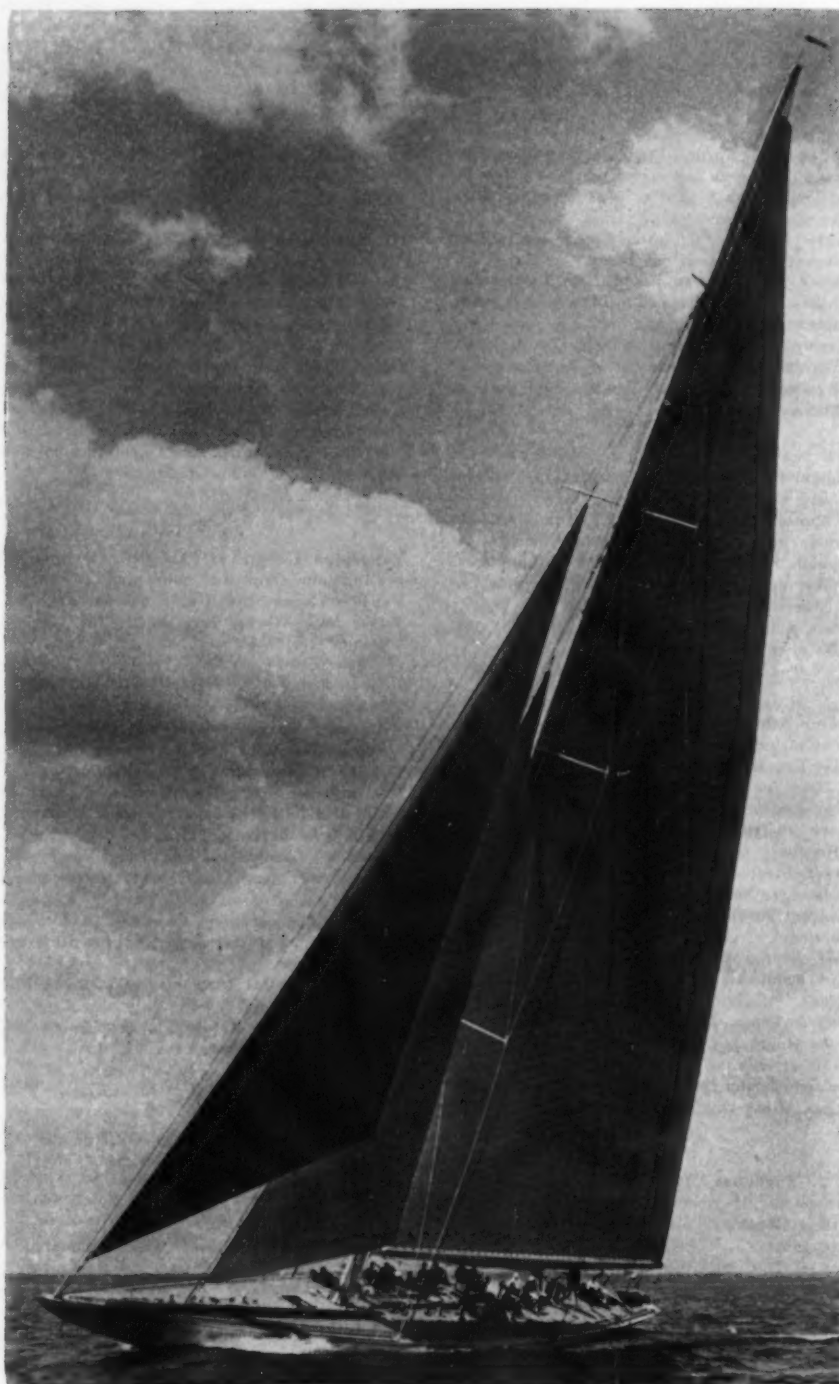
**Youngstown Sheet & Tube Co.**, Booth 498. Sheet; tubes; wire; alloy steels.

## ... Z ...

**Carl Zeiss, Inc.**, Booth 397. Microscopes; spectroscopes; magnifiers; precision measuring instruments.

AS Watt learned about steam from watching his wife's tea kettle, so perhaps did the rolling of iron and steel result from observation of the bread board and the rolling pin. Be that as it may and whatever the inspiration may have been, the art of rolling has been the chief instrumentality in developing the steel age. Construction owes its existence to the rolling mill.





America's cup defender Rainbow with a "bone in her teeth." Note the steel stay rods which replace the usual cable brace stays.

**A** VERY interesting example of the application of aircraft methods and principles to other than aircraft use is found in the steel stay braces used to support the mainmast of the American Cup Defender, "Rainbow," (Burgess & Donaldson, designers.)

The use of solid heat treated steel stays in place of cable is believed to be new in yachting practice. The advantages include lowered wind resis-

tance and lighter weight. This applies both to the terminal connections, which can be made lighter and more compact, and to the body and shank of the rods, provided steel of very high strength is used. These rods were fabricated by the well-known aircraft manufacturer, Glenn L. Martin Co., of Baltimore.

They were of chrome-nickel electric furnace steel S.A.E. type No. 3240, manufactured by the Republic Steel

## ▲ ▲ ▲ Heat

**U**NIQUE in yachting practice is the Rainbow's use of solid, heat treated stays in place of cable. The advantages are lighter weight and decreased wind resistance.

Some of these rods are 18 ft. in length, which makes their heat treatment an unusual problem. In this article, the author, who was responsible for their heat treatment, tells how the job was done.

Corpn. and specially selected for workmanship and composition. Mill analysis:

C.—0.39%	Mn.—0.50%
Cr.—1.10	S.—0.017
Ni.—1.75	P.—0.010

A tensile strength of 180,000 lb. per sq. in. minimum was specified and a proof test equivalent to 140,000 lb. per sq. in. was applied before acceptance. The designed working stress was 70,000 lb. per sq. in.

There were 56 rods manufactured in all, including spares, in seven sizes from 0.540 in. to 1.09 in. shank diameter, and from 13½ ft. to 18 ft. long. The ends were upset and threaded with Whitworth threads, right and left, for the attachment of turnbuckles and terminal fittings. The latter were greatly similar to aircraft practice and were specially heat treated.

These stay rods presented a very unusual and difficult heat treating problem because of their great length, slimness, high strength and other exacting requirements. The threads having been machined before heat treatment had to be protected during the process. In order to remove internal stresses and refine the structure resulting from hot forging (up-setting) the ends, it was required that the rods be normalized by heating to

# Treatment of Rainbow's Stay Braces

By HORACE C. KNERR

President, Metallurgical Laboratories, Inc.  
Philadelphia

1550-1600 deg. F. and allowing to cool freely in air. After normalizing, the rods were reheated to 1450-1500 deg. F., held for 20 min. to 1 hr. at temperature, according to their diameters, to insure saturation, and quenched in oil. Finally they were tempered for 1 hr. or longer at 750 deg. F.

Heat treatment was done by Metallurgical Laboratories, Inc., better known as "Metlab," in a vertical electric furnace having a heating chamber 25 ft. high and 2 ft. in diameter. The rods were suspended during the heat treating process by special clevis nuts screwed on to their upper ends. In quenching they were lowered endwise out of the furnace into an oil bath 27 ft. deep directly beneath. This vertical suspension and quenching insured straightness. Any distortion such as would occur in the ordinary process of treating in a horizontal furnace would have resulted in the rejection of the rods, as no great amount of straightening would be possible or permissible at the high strength required. Furthermore, the almost instantaneous transfer from furnace to quench bath, and the great uniformity of temperature in the furnace resulted in a combination of high strength and ductility.

Because of the mass effect of the enlarged threaded portion it was necessary to have the rods themselves somewhat overstrength to insure adequate strength at the root diameter. Several test specimens of various diameters accompanied each heat, some being placed at the top, middle and bottom of the charge. Test results ran from 190,000 to 210,000 lb. per sq. in., with corresponding minimum elongation of 13 per cent to 11 per cent in 2 in. The toughness of the material at this high strength was

noteworthy. Samples withstood severe bending before fracture.

Threads required only a light re-finishing to clean them up after heat treatment. The rods were finally pickled and cadmium plated.

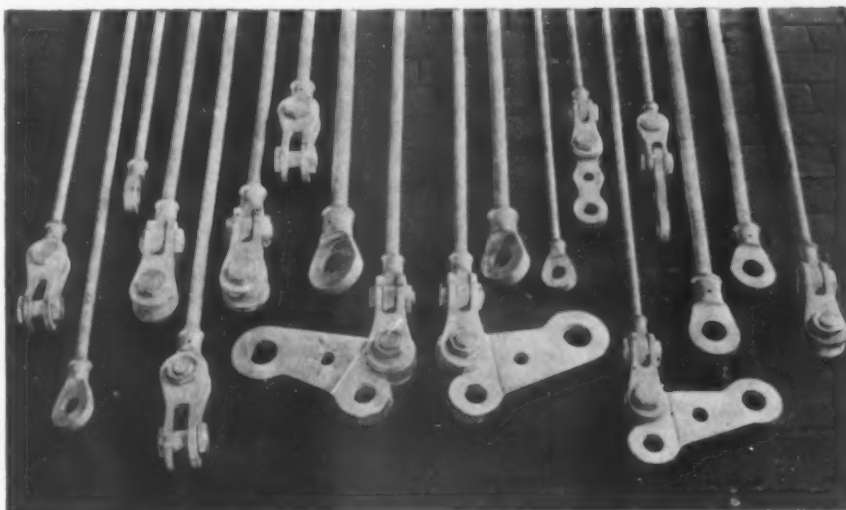
As to straightness, the specified tolerance of 1 part in 1200 was ex-

ceeded. The rods showed only a gentle bow which would disappear under the weight of the rod itself when laid on a flat surface.

The Metlab vertical furnaces and other unusual and exacting jobs done in them will be described in an article to follow at a later date.



Here are the rods of various length which form the stays of Rainbow. They are made of chrome-nickel electric furnace iron and test to 180,000 lb. per sq. in.



Here are the terminals of the stays which join the various rods.



# In Business Risk Lies

**A**LMOST every one of us, directly and instinctively, feels that severe competition is an evil. It keeps us perched for long periods on the sharp knife edge of anxiety. We must plan instead of loaf. We must calculate instead of day-dream. It is easy to plan and calculate amiss, and fatally easy to lose thereby our precarious foothold and plunge into the abyss of failure.

Yet there occur for many of us periods of ease and prosperity. These may be due to the chance of a lucky guess, to being "on the elevator when it is going up" or to fortunate changes in business demand which we are in a position to supply; or they may really be due to good judgment, organizing ability and technical skill. Success comes both ways. The point is that we are prone to feel that easeful success is the natural and attainable state of business, that the sum of the competitive problems of individual business constitutes the problem facing business as a whole, and that in consequence the recovery of business depends on the control of competition.

## Competition Essential to Progress

Completely to the contrary, we must be prepared to consider whether the health of business as a whole and the general prosperity of society may not depend on a considerable measure of insecurity for the individual business; and whether our present efforts to protect whole industries from competition may not both delay recovery, and render inevitable a Governmental dictatorship (real, even though disguised or unacknowledged) which will choke the rapid advance of our productivity and slow up or diminish the distribution of its products as a raised standard of living for the masses of the people.

As to the health of society as a whole there can be little question, when looked at from the purely material standpoint. The raising of the standard of living in its tangible elements—food, clothing, shelter, automobiles, radios, organized amusement—has been most effective during periods of activity combined with competition. This competition was carried out in terms of lowered price and expanded output, and little of that output failed to reach the consumer's hands. Even in the case of such intangibles as education and public in-

IN an address, reproduced here substantially in full, Mr. Flanders told the American Trade Association Executives, assembled in their annual meeting at Washington, Sept. 20, that the spur of competition is essential to the safety of our social order. Risk taking, in his view, is a prerequisite of business health. Without it, lower living standards are inevitable.

The fixing of economically excessive wages and prices through trade union and code control, in his opinion, constitutes the greatest danger facing the public today. It will result in a multiplication of Governmental efforts to regulate the complex and intricate interrelationships of employment, production, wage rates and prices, until business freedom is finally extinguished and complete dictatorship is established.

stitutions, museums, hospitals and the like—the era of competition has left behind it a cultural deposit at which this chastened generation may well look with wistful eyes.

But we must not blind ourselves to the debit entries on the balance sheet. The turmoil of competition takes place in an atmosphere of tension and anxiety. For leadership, whether in business, in politics or finance, there must always be tension. There is no leadership without it. That is the price the leader pays. There need be little anxiety if there is vision and courage. The bad element of those competitive times lay in the fact that the tension and anxiety descended below the rank of leadership and permeated the mass of society. This was bad, for it is the office and crown of leadership to relieve tension and anxiety in those who are led. Our problem is then to preserve the social fruits of vital competition without laying burdens thereby on the mass of the population.

First we may consider as to whether there have been forms of competition

in the past in which for society as a whole the debit account has wiped out the credit. One example we may point out without hesitation.

Competition is a social danger when it takes the form of prices lowered by the cutting of wages below subsistence standards. When the only way to survive is to cut wages below competitors who are already paying sweat rates, the social desirability of survival is doubtful. Large areas of the needle trades were in this condition previous to the NRA, though over the preceding decades conditions had been improving rather than the reverse, due to combined union activity and the development of a social conscience.

## Where Competition Has Been Stifled

But this same endeavor to protect wages may be carried to a socially undesirable degree as has been done, for instance, in the building trades.

The major part of the persisting unemployment is located in the capital goods industries. More than half of the unemployment in these industries is to be found in the building trades.

Now the building trades constitute the outstanding success of trades union policy and philosophy in this country today. These unions and their leaders have protected their members with the shortest hours and highest wages that are enjoyed by any workers, unless it be among the railroad brotherhoods.

But this success of union policy has delayed recovery in business as a whole, and has kept its individual membership out of work. It is so out of step with other industries that under union conditions building is not profitable where true business profit is sought. Building is only profitable where a speculative profit is hoped for.

As a consequence the concentration of building in our boom periods constitutes one of the serious elements in economic instability, as does its corresponding heaviness in recovery. And the individual union member suffers thereby. If he is making a living at the present time it is as likely to be by tending a gas station, running a taxicab or by working clandestinely under non-union conditions.

Of course it is argued that the desirable aim is to level wage and hour

# Social Safety

By RALPH E. FLANDERS  
President, Jones & Lamson Machine Co.

conditions in all other industries up to the building trades level. If this were done even the fancied advantages of the protected trades would disappear, the increased purchasing power would prove fallacious in the face of advancing prices, business profit would drop below the present unsocial minimum (in which reemployment in capital and luxury goods industries and in service and cultural occupations is so sluggish) and the total hours worked would not provide the standard of living which the American worker deserves and can attain.

Briefly, competition should be prevented from driving wages below a reasonable subsistence level, and hours should not be permitted to exceed humanly desirable limits which keep in view the standard of living available and desired. As we make rigid provision beyond this point we tend to approach the unsocial and uneconomic conditions now existing in the building trades.

## When Too Much Success Spells Failure

Still more briefly, we can say that the labor union may be a good thing if it isn't too successful according to its own standards.

Lest this guarded statement elicit premature approval from some of you, let me say that I hope to show that the same thing is true of the trade association, or of industry organized under the codes. Such an association or organization may be a good one, socially and economically, if it isn't too successful and doesn't go too far.

## Union Policy Paralleled in Code

In the criticism of trades union policy a particular group of unions was named. If we are to play fair, we must take a specific example from the NRA in drawing our parallel. The lumber code is a case in point.

This code is not only interesting, it is admirable in many respects. For one thing, its price protection provisions are applied to a natural resource, whose preservation and economic use is fraught with a particular social interest. The price of timber on the stump is in a category differing from that of mouth-organs in a Woolworth store.

In the second place, a truly wonderful task of coordination throughout



RALPH E. FLANDERS

the whole industry was carried out by those who devised the code and secured its adoption. All of the elements involved were welded into a homogeneous organization. This is as far removed as possible from the separate unions of the building trades group with their separate jurisdictions and jurisdictional disputes, such as the disgraceful one which hindered the completion of the new Government buildings in Washington, or the ludicrous one which prevented the completion of the monument to Samuel Gompers until too late for its dedication.

Finally, the code is having expert and far-sighted administration, so far as a bystander can judge. Although its provisions for price protection extend all the way from the stump to the finished mill-work on the building lot, those responsible for it have not let the code rest as a finished, immutable and imperishable monument. When it became evident that the resulting increase in lumber prices, added to the already heavy labor

costs and the high land values (this last is a topic in itself) was restricting the essential recovery in construction, the code authority took steps to reduce prices by the substantial figure of 15 per cent. The building trades stood pat, except as they permitted local unions some latitude in local negotiations.

Yet with all its excellences, we have here a new and doubtful institution—a legalized association which gives price protection to all its members, and in so doing introduces rigidity into what had been a flexible price structure. Automatic adjustment to new conditions are banned, the judgment and wisdom of human beings are substituted. These human beings have to decide for a whole industry what shall be the proper return for each element in the chain, whether the end price shall be maintained to protect the weak, or lowered to get business. The pressure on them to protect the inefficient will be tremendous, as it has been in the case of the unions. Yet if they do so, and prices are abnormally protected, output will be cut down, employment diminished, production and distribution of wealth slowed up and the standard of living depressed.

## Code Theory a Twin of Labor Union Theory

Code theory, in its full development, is thus on all fours with trades union theory. Its purpose is to assure income to the whole group. There was a clear intent in the drafting of the recovery act to permit a lessening of competition and an increase in agreement and cooperation to a degree previously illegal, in return for a socially desirable minimum wage provision on the one hand, and a socially dubious official support of trades unions on the other. Trades union theory and industrial organization theory were to be put on a parity, with the expectation that a lusty recovery would be the natural offspring of the curious alliance.

Our legislators cannot be blamed for this. It was the business men who were most thoroughly sold on the idea that recovery and continued prosperity depend on the restraint of competition.

All of this makes for a very different world from that of the "entrepreneur" in the technical economic



sense, or of the "business man" if we are to use the language of the street. The business man of the past was entitled to protection because he was willing to take risks and because his risks were obviously in the public interest. His taking of risk, unprotected by code provisions, meant that there was a high mortality among the riskers; but in the aggregate and in the long run the result was the falling of business into the hands of the efficient, and the sale of goods and services to the public at a lowering price. Finally, the industry itself had its maximum of protection against competing industries.

### The Road to Dictatorship

There is no such protection to the public or to the industry in a universal extension of the practices of the lumber code. Inevitably the Government must be the arbiter, as it would have been long since in the building trades unions and others like them, if their superior political acumen and power had not protected them. Business, without these qualities, is an easy prey for the future.

Nor is there hope for a vitally expanding industry and a rising and better distributed standard of living in the best possible Governmental supervision or control. The control will be no better than the aggregate of the individual controllers; the quality of this aggregate will fall far short of the best of these individuals composing it; and the best of these, in turn, cannot be good enough to function even in a small area as well as have the outmoded forces of competition.

The arguments for competition are many and are based on experience. The arguments for arbitrary control (into which we are being drawn with accelerated velocity) are few, dubious and based on hopes not experience.

### Automatic Adjustment vs. Complex Control

Competition is the democratic method of industrial control. It is based

on dollar votes in the hands of the public; and those votes are made effective, through the profit motive, in determining what goods and how much shall be provided to meet the needs, wants and whims of the population. It is a quickly responsive mechanism, and no arbitrary control can take its place in any way as satisfactory to the great mass of our fellow-men.

"Consider, for example, the innumerable variety of products available to the holder of purchasing power in Wanamaker's or Macy's in New York, Marshall Field's in Chicago, or File-ne's in Boston; or if you live in the country, as I do, turn the pages of a Sears-Roebuck or a Montgomery-Ward catalog. What an incalculable profusion of items! Many are of doubtful usefulness and of more than doubtful beauty. But private initiative has made this array open to the choice of the ordinary man. It is an achievement in democracy of the first order."

Corresponding to this intricacy of variety in goods offered for sale is the like intricacy in the interweaving of the expanding and contracting channels through which the raw materials for these goods are drawn from sea, mine, field, and forest, transported to factories, thence to wholesalers, thence to retailers, and finally put into the hands of the consumer; and a similarly intricate interlacing of channels and services guides the counter-flow of money and credit. We are rapidly being drawn toward a condition where this complicated procedure must be governed by the judgment of human beings, confronted as with hundreds of thousands of valve handles, which must be turned just the right amount, in just the right direction, at just the right time.

Why attempt this feverish and frantic solution, whose difficulties are already apparent, when competition and the profit motive have demonstrated their ability to perform these intricate adjustments with the unselfconscious effectiveness of natural forces—which they really are?

But in spite of its excellent record, competition is in disfavor on two counts. It is said to have failed in providing the population with the dollar votes for making effective selection of the goods it desires; and it is said to be a waning force, soon to die of natural causes, which must perforce be replaced by artificial substitutes.

As to the first, the answer is short. Competition, and the profit motive which activates it, have behind them in the last century a record of material progress which is unparalleled in the history of civilization. In no past time has the common man had the material goods with which our time and our system have provided him. This progress is not all due to the competitive order. That has furnished the riches and built the mechanism for distributing them. Other elements have shared in the improvement in distribution, but not in the provision of plenty.

At worst, competition has not prevented social progress of the most altruistic sort. Virgil Jordan has called attention to the fact that under the old, bad system, child labor was reduced by more than 1,000,000 in the period between 1910 and 1930; and with all of our justifiable celebrations and hallelujahs, the NRA had only the remaining 70,000 to take care of. Virtue is not exclusively an attribute of the new order!

### Inflation, Not Competition, Cheated Common Man

But the common man is unsatisfied with his share of dollar votes—mildly dissatisfied in good times, deeply and desperately so in depression. It is not the operation of competition in productive business which has failed him. He has been cheated, as have those who would gladly give him more and higher-paid employment, by the injection of billions of credit currency into the business system, first by Governmental war financing, and second by inflationary speculation.

A redistribution of material wealth was effected thereby into the hands of those who have rendered no business service, and there followed therefrom the subsequent and inevitable destruction of this purchasing power by deflation. In the face of such a social disaster, what are the minor annoyances attending the operations of competition in business? The legislators or Government officials who look on that disaster, and then use it as the excuse for throttling productive business, are enemies alike of the worker and of his employer.

To conclude this point, the greatest progress of the worker in real income (expressed in the volume of goods and services made available to him) has always taken place in the periods of active healthy competition. His best hope for the future lies in a return to



FROM the blacksmith's anvil to the huge hydraulic forging press is a far cry but a direct one. Fundamentally, there is little difference between the simple forging of a stone cutter's chisel and the forging of a huge propeller shaft for a battleship. The evolution lies in the means. Prominent in this evolution have been the very men who have given us what, today, we call metallurgy.



and an extension of those same conditions.

### Answering Rexford Tugwell

But there still remains a weighty weapon in the armament of those who would build a new order on the deliberately ruined remains of the old. Competition, they tell us, is actually a thing of the past. It is dead beyond all reviving.

The current protagonist of this view is Rexford Tugwell, Assistant Secretary of Agriculture. In recent articles in the Sunday Magazine of the New York *Herald Tribune* he has correctly described how competition, acting through the price system, has controlled production and distribution in accordance with the abundance or parsimony of nature, the efficiency or inefficiency of business and the changing wants of the consumer. He has detailed the accumulated restraints on the free market with its flexible prices—the increase in size and power of business organizations, the frequency of secret understandings and, since the codes came in, the proliferation of legalized price control. (He does not mention the rigidities of union wage scales.) From all of this he infers that the competitive price system had already broken down in the last boom, and that this breakdown was an effective agent in the collapse; and that the continued degeneration of the system since then renders any return impossible. Neither inference is justified.

On the contrary, price competition was effective up to the last, over so large a percentage of total business that it remained the normal element of control. The abnormal element which destroyed this control was, as we have seen, the invasion of productive business by speculative inflation.

### Academic Misconceptions

The breakdown of competition is, in any event, grossly exaggerated by those looking at business from the outside. The business man himself knows that it extends to other areas than that of price, and that price competition persists even where concerted effort is made to control it. Effective monopoly, outside of public service corporations, is rare. The Aluminum Co. of America and the United Shoe Machinery Corp. have few counterparts. Even the overshadowing United States Steel Corp. has seen at least two new competing organizations built up during the depression, when its own financial strength might be supposed to give it an overwhelming advantage.

### Poisoned Bait

But when Mr. Tugwell tells of the decay of the competitive price system under the codes he is on solid ground. This is the really dangerous element in the progressive disintegration and surrender of business initiative. This

is the damage we are doing to ourselves.

The temptation is great. As already noted, it is difficult for us as individual business men to see competition as anything but an evil. And so we grasp at the chance offered by the codes to free ourselves from its annoyances and dangers and seek protection in an ordered and controlled business economy. The bait is tempting, but the trap is strong, swift and sharp; and the bait is poisoned. Mr. Tugwell knows, and we will learn, that safety and ease are purchased at the cost of Governmental regulation. He does not realize that there is a price to be paid by the general public as well. There is developing an inevitable loss of efficiency, a growth in wasteful bureaucracy, an asphyxiation of constructive private effort and a resulting decrease in the general standard of living. This will be a heavy price for the worker of this country to pay for a transient sense of security for himself or for a similar illusion on the part of the business man.

### Where Our Present Course Leads

As for the inevitability of an actual, if unacknowledged, Governmental dictatorship, listen to a quotation from a recent address of an economist of world-wide renown, Prof. Gustav Cassel of Sweden—a country where, by the way, matters have not been badly managed in the past few years.

"The leadership of the state in economic affairs which advocates of planned economy want to establish, is, as we have seen, necessarily connected with a bewildering mass of Governmental interference of a steadily cumulative nature. The arbitrariness, the mistakes and the inevitable contradictions of such policy will, as daily experience shows, only strengthen the demand for a more rational coordination of the different measures and, therefore, for unified leadership. For this reason planned economy will always tend to develop into dictatorship.

"The risk of such a development is

naturally greatest in those countries that have suffered most, and whose people are traditionally accustomed to subordinate themselves to some form of dictatorship. Strong resistance can only be expected from countries where individual freedom has been looked upon through centuries as one of the most precious attainments of civilization and, at the same time, as a fundamental condition for its further development. But even in such countries the modern fancy for planned economy has driven people much further on the way to dictatorship than is generally recognized.

"The existence of some sort of parliament is no guarantee against planned economy being developed into dictatorship. On the contrary, experience has shown that representative bodies are unable to fulfill all the multitudinous functions connected with economic leadership without becoming more and more involved in the struggle between competing interests with the consequence of a moral decay ending in party—if not individual—corruption.

"Examples of such a degrading development are indeed in many countries accumulating at such a speed as must fill every honorable citizen with the gravest apprehensions as to the future of the representative system. But apart from that, this system cannot possibly be preserved, if parliaments are constantly overworked by having to consider an infinite mass of the most intricate questions relating to private economy. The parliamentary system can be saved only by wise and deliberate restriction of the functions of parliaments."

These are strong words, but I, for one, cannot read them without conviction of their truth.

### Independence Must Be Rewon

What then is our duty as business men? Our first duty is that of a change of attitude—of our whole business philosophy. We must reverse our surrender of independence and must discard such plans as we have made for a safe and inglorious business future. We must gladly and willingly risk the old dangers, for only in the

WELDING is the marriage of metals. Like a good marriage, a good weld is made for life. Like a good marriage, too, welding is fruitful of many children. No phase of metallurgical progress has set a faster pace, of late, than has welding. We find its offspring scattered throughout the whole field of machine design. And they are strong, healthy children who promise great things for the future.



face of those dangers is real safety to be found. Business men must not themselves succumb to the more shortsighted of trades-union ideals.

To get down to practical details, there is much in the codes that we will want to throw away, but much that we will want to save.

We will preserve the minimum wage clauses, though perhaps more carefully studying the problems of regional variations and the desirable variations as between urban and rural conditions. If the Administration will wholeheartedly encourage private profit and private initiative, we may look forward to a general raising of these minimums.

We will oppose further shortening of the hours, as destructive of hopes for a raised standard of living. It is doubtful if the pitifully low standard of 1929 can be reproduced on a 40-hr. week. Further shortening will put the same sort of a brake on recovery and prosperity that is now effective in the case of the building trades.

The child labor clause at 16 years must be preserved and enforced; but attempts to raise the limit beyond that age must be vigorously fought in the interest of the youths themselves—and with no other interest whatsoever, conscious or unconscious.

Open prices must not merely be permitted, they must be enforced. There are ways of preventing open prices from becoming fixed prices. In some industries it will be done by eliminating the waiting period entirely, in other cases by eliminating it for decreases but retaining it for price raises. Every proper provision should be made for quantity discounts, or for lower prices on goods made out of season, or for any other economically sound concession to the large or astute buyer. But secret prices must go.

Certain of the "unfair practices" clauses should be retained, discarding the great mass which looks toward a restriction of effective competition. Bribery, dishonesty—these are obviously out of place in self-respecting business.

Other harmful practices have grown up as trade customs in certain industries. As an example, there is the privilege of countermanding an order, which in the woolen industry reached the limit of returning for full credit goods on the purchasers' shelves, unsold at the end of the season. An order is a contract, and should be so considered.

The unfair advantages of size should be forbidden as, for instance, the piecemeal destruction of competition by price cutting below cost in restricted areas, while recouping by increased prices elsewhere.

These elements may not be all that is allowable or desirable in code construction, but they are typical of that which should be preserved. They give ample scope for trade association ac-

tivity and code usefulness. A code so formed is a far cry from the more elaborated structures on which it is sought to build up fully controlled and protected industries. We can survive a few fully organized unions or industries, but complete organization on the basis of the building trades and the lumber code would imperil the American standard of living.

### The Road to Social Demoralization

This paralysis of courage and of individual responsibility, with which we have been tainted, has already touched the younger generation. From the natural feeling of helplessness in the face of the economic crisis there first developed among them a shame-faced acceptance of public support, which in far too many cases has ripened into a complacent dependence on society. From this it is a short and easy step to outright demand of support as a right, without compensatory duties. Is it any wonder that millions of our youth have taken that step? They but reflect in their sphere the supine surrender of their elders.

In his address, before referred to, Gustav Cassel thus draws to his conclusion:

"If we allow economic freedom and self-reliance to be destroyed, the powers standing for liberty will have lost so much in strength that they will not be able to offer any effective resistance against a progressive extension of such destruction to constitutional and public life generally. And if this resistance is gradually given up—perhaps without people ever realizing what is actually going on—such fundamental values as personal liberty, freedom of thought and speech and independence of science are exposed to imminent danger. What stands to be lost is nothing less than the whole of that civilization that we have inherited from generations which once fought hard to lay its foundations and even gave their lives for it."

### Rubicon Not Yet Crossed

But we in America need not suffer this loss. We have not gone so far along the descending road that return is not possible. And in returning we need not seek merely to duplicate a *status quo* to which no one would willingly return.

Our hardest task is to put in effective operative form that community of interest which exists between the workers and the industry in which they are employed. On the false trails both have been following, by way of super-organization and destruction of competition, both groups find themselves faced with the loss of their dearest attainments and hopes. Together we are being deprived of the material values of a raised standard of living, and the spiritual values of liberty. The form of our needed cooperation is not clear. Perhaps the need is not so much for formal cooperation as for direct recognition of these mutual interests.

As to other particulars it is possible to look ahead more clearly and with assurance.

We can so arrange that the larger monetary rewards shall more nearly represent equivalent service to society and shall act as effective distributors of purchasing power.

We can provide subsistence and lift the fear of want for his dependents from the soul of every willing worker in this land.

We can keep open and enlarge the door of opportunity to every youth with the will and capacity for social service, whether in business, the professions or the arts.

We can increase the general standard of living, and distribute it on a more equitable basis.

All this and more we can do. But if these things are to be done, we who are devoted to the discipline of business must direct our steps anew toward an ascending pathway.

## Sheet, Rail and Pipe Exports Gain Sharply

SIX of the leading items in the export trade of the United States in iron and steel products registered gains in the first seven months of this year as compared with the corresponding period of 1933, according to an analysis made in the Commerce Department's iron and steel division.

With the exception of iron and steel scrap and tin plate, the leading iron and steel classifications exported from the United States in the January-July period of 1934 were black sheets, 50,361 gross tons, against 13,684 tons in the corresponding 1933 period; heavy rails, 43,623 and 17,922 tons; galvanized steel sheets, 36,317 and 17,926 tons; seamless casing and oil-line pipe, 29,705 and 14,529 tons; steel bars, 24,198 and 10,746 tons; and barbed wire, 21,605 and 13,007 tons.

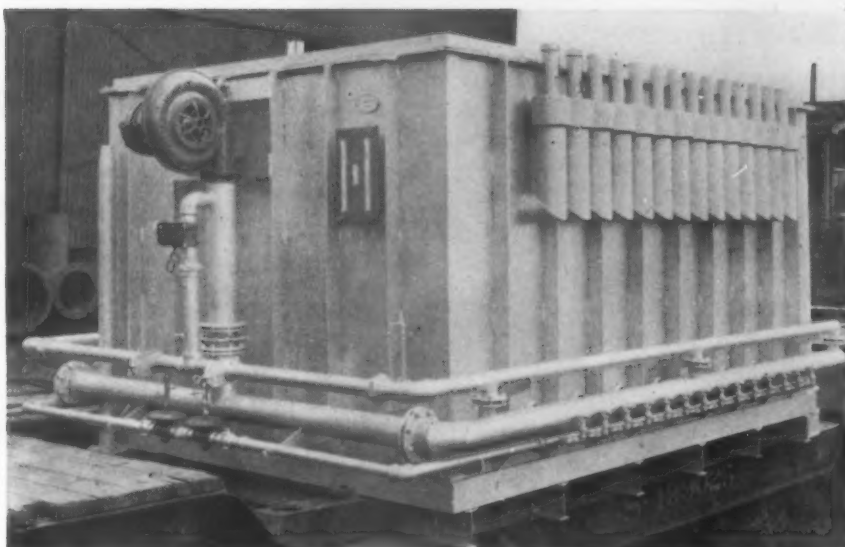
This sharp increase in shipments, it is pointed out, is more striking when it is considered that the six products enumerated accounted for nearly 14 per cent of the 1,486,360 gross tons of iron and steel products (involving a total of 61 classifications) shipped abroad by the United States in this period. No shipments to Hawaii, Puerto Rico, or Alaska were included in the analysis.

The chief markets for black steel sheets in 1934 were Canada, Mexico, the Soviet Union, China and Australia; the largest shipments of heavy rails were consigned to Brazil, China and Colombia, while galvanized steel sheets went principally to the Philippines, Brazil, Colombia and Mexico.

The outstanding foreign markets for seamless casing and oil-line pipe during the current year were Venezuela, British India, Argentina and Mexico.



# New Sheet Annealing Unit Reduces Heating and Cooling Time



One set of the chrome-nickel steel tubes used for heating the cover of the Wilson box annealing unit for sheet steel can be seen in this picture. The tubes are U-shaped and are fired at the bottom by individual burners.

**F**OR box annealing sheet steel an annealing unit consisting of a cover and bottom that together also form a furnace, eliminating the usual box annealing furnace, has been brought out by the Lee Wilson Engineering Co., Cleveland, and is claimed to offer numerous advantages over the ordinary method of box annealing including a sharp reduction in both the heating and cooling time.

The cover is heated by two sets of tubes, one series on each side of the cover. The heat is transferred through the walls of the tubes and radiated to the pile of sheets. Each tube is fired at the bottom by an individual burner, fuel being burned inside the tube. The tubes are U-shaped with a horizontal section at the burner passing through the side wall, then vertically along the inner side of the cover, bending out through the side of the cover and then upward along the outer side of the cover, from the top of the tube the products of combustion are exhausted to the atmosphere. The tubes are chrome nickel steel 4 in. in diameter. A cover of usual size has 24 tubes, 12 to a side. The cover is fired with gas or oil, preferably the former with a pressure of 8 oz. or less.

The cover is constructed of  $\frac{1}{4}$ -in. steel plates welded inside and out. The inside is lined with insulating brick so that there is little heat loss. The bottom is of welded steel construction consisting of a bottom plate, insulating concrete, a  $7\frac{1}{2}$ -in. layer of insulating brick forming the floor, which supports rails on which is mounted the base plate on which sheets are piled as in ordinary annealing bottom. An oil seal between the cover and bottom provides a positive as well as a clean method of sealing. The construction, it is claimed, assures an annealing unit that is absolutely air tight.

The cover burners are manifolded together permitting fuel and air to be controlled from one motor operated main valve. The valve is opened and closed by a control pyrometer, making the temperature control automatic.

Air for combustion is furnished by a blower located at the top of one end of the cover. The blower is also used for cooling purposes by forcing cold air through the heating tubes in order to effect rapid cooling. The rate of cooling is regulated by the amount of cold air that is passed through the tubes. In case slow cooling that results from natural radiation is desired, the blower system is not used for cooling.

The burners, valves, air and gas piping are assembled to the cover. When the sheets are being placed on the base a thermocouple for the control of the heat is attached to the side of the pile. The cover is placed over the pile by a crane, and the oil seal is filled. Then the gas connection is made with a flexible hose and an electrical connection for the blower is made with an ordinary plug-in socket. After lighting the burners and setting the control pyrometer for the desired temperature the cover is said to require no attention until the heating cycle is completed, save an occasional checking of the pyrometer.

The cover and bottom shown in the accompanying photograph shows an unusually large unit that has been built for annealing sheets 75 in. wide and 144 in. long. The large pipe 6 in. in diameter supplies air for cooling, the 3-in. pipe above the air for combustion and the lower pipe 2 in. in diameter is the gas supply line.

A reduction of one-third both in the heating and in the cooling time is claimed for this annealing unit as

compared with the use of the ordinary cover and bottom and box annealing furnace. Other advantages claimed are positive control of the heat, uniform heating at top and bottom, uniform control cooling, control of deoxidizing, long life of cover and bottom, and reduction in fuel requirements.

## Further Business Decline Reported

**F**URTHER declines in business were recorded in August and the first half of September, the time when seasonal improvement ordinarily gets under way, according to the monthly report of the conference of statisticians in industry of the National Industrial Conference Board. The uninterrupted downward movement in industrial production since May brought the August level of business activity almost back to where it was last November when the recent upturn began. While commodity prices advanced in August, security prices showed measurable declines. The cost of living continued upward.

Productive activity fell off again in August; improvement is normally seasonal in major industries during the month. Automobile production and steel and iron output were contracted further instead of expanded. Advances of a less-than-seasonal nature were noted in the production of bituminous coal and of electric power. Building and engineering construction contract awards were practically unchanged during the month. Textile material and apparel production were further curtailed in August, while the strike in September brought operations down to new low depression levels.





## Develops Diamond Wheel for Grinding Carbides and Other Hard Tool Materials

Frank J. Tone, president, Carborundum Co., inspecting one of the company's new diamond grinding wheels for shaping and conditioning cemented carbides and other hard materials.

or non-alkaline rust-proof solution being employed.

### Carbides Rough Ground with Rapidity

Test results obtained with the diamond wheel are striking. In grinding pure cemented carbides the coarse grit wheel is said to have shown stock removal 13 times greater than with the specially developed standard abrasive wheels. In grinding of mounted tips, that is, grinding the tool steel stock as well as the cemented carbide, the diamond wheel removes four times as much stock. It is also stated that use of the fine grit diamond wheel eliminates the necessity for lapping, the new wheel producing a lapped finish and the tips having clean, straight edges without nicks and with tool faces true. There is no overheating of the tool material; in this connection it is stated that the operator can force the tool against the wheel with maximum hand pressure without it becoming even uncomfortably warm.

The wheels need no dressing; in fact, as previously stated, it is impossible to dress them. They are cleaned or freshened by wet scrubbing, using pumice or a soft abrasive stick. The thousands of tiny diamonds that stand out like so many miniature cutting tools do not break down or crush.

Tests in other fields indicate varied future uses for the new diamond wheel, particularly on extremely hard types of metals and on non-metallic substances. They have been used, for example, in cutting industrial diamonds such as commonly used in boring bars for high-precision finishing of deep holes. In laboratory tests, such stones are reported to have been cut in 4 min., taking off as much as 0.008 in.

Six and 7-in. diameter wheels of the type described are available in the grades mentioned, for peripheral and side grinding. Other sizes will be stocked as called for. Demonstrations of these new diamond wheels will be a central feature of the company's exhibit at the National Metal Exposition.

**E**XHIBITS of the Carborundum Co., Niagara Falls, N. Y., at the forthcoming National Metal Exposition will include a new diamond wheel for shaping and conditioning of Carboloy, Firthite, Vascoloy-Ramet, Carmet, Widia and other hard cemented carbides used for turning, boring and other cutting tools. It is expected that the new wheel will also find wide application in finishing other materials and metals difficult to grind quickly and economically.

In announcing this important new development, the company points out that metal hardness has been gradually approaching that of manufactured abrasives, culminating in the cemented carbides, the hardest of all manufactured materials. Manufactured abrasive Carborundum Brand Silicon Carbide, for example, is rated at 9.17 on the Mohs' scale, and the cemented carbides at 9.12 to 9.14, with the diamond at 10. Though small, the difference in hardness between the manufactured abrasive and the cemented carbide is sufficient to enable the special Green Grit Carborundum brand wheels to do a creditable job in grinding the cemented carbides. The demand for greater speeds and production, perfection of finishes and edges has now led to development of the new diamond wheel as companion for the company's Green Grit product.

### Small Off-color Gem Diamonds Used

Diamonds used in manufacture of the new wheel are not of the so-called black or carbon type, but are yellows, whites and grays of the gem

variety that are sufficiently off-color and so small as not to be desirable as gems. These diamonds are crushed by a special process and the resulting grains or grits accurately graded through a series of standardized screens.

Production of the new wheels also involved development of a bond that would be sufficiently tenacious, tough and durable to assure permanent holding of the tiny diamonds and give them full opportunity to cut.

Since regular or solid wheels with diamonds as the abrasive would be prohibitive in cost, a composition form or backing, to which is applied a coating of the diamonds and the bond, was devised. This layer, about  $\frac{1}{8}$  in. thick, is applied to the side of the wheel-form for side grinding and to the periphery of the form for cylindrical and other types of grinding. The wheels are then baked by a special process. Throughout the manufacturing process they must be held to micrometer exactness and balanced to within a fraction of a gram. They are so hard that it is impossible to turn or dress them to size.

These new wheels are made in three grits; namely, the comparatively coarse, 90 grit; the fine, 220 grit; and the extra fine, 400 grit. With this range it is said to be possible to do comparatively rough grinding or stock removing with the coarse wheel to produce an edge superior to lapping with the fine wheel, and to produce an exceedingly keen edge and a mirror surface finish, where required, with the extra-fine wheel.

Grinding is done wet, plain water

## Small, Portable Quartz Spectrograph Permits Rapid Analysis

**A**MONG other new instruments, the Bausch & Lomb Optical Co., Rochester, N. Y., will show at the National Metal Exposition the new small Littrow quartz spectrograph pictured on page 38. Simplicity of design and easy portability are features. The range covered is from 2100 Å to 7000 Å and the linear dispersion between these limits is approximately 150 mm. Length of individual spectrum lines on the photographic plate is 3 mm. As this entire range is covered in a single spectrogram, no adjustments of lens or prism are required as in larger instruments of the Littrow type. This permits rigidity and permanence of adjustment, since the optical system has no movable parts.

This instrument is not intended to replace the medium or large spectrographs for work on complex spectra, where the lines are very close together and require high resolving power and dispersion for satisfactory separation of the lines. In the case of simple spectra, especially the non-ferrous metals, this instrument provides a very rapid tool for analysis. This is said to be particularly true if the desired information can be obtained in the short wave length portion of the ultra violet, where the linear dispersion and resolving power of a quartz spectrograph are much greater than at long wave lengths. The detection of silver, copper, bismuth, tin, and antimony, in pig lead; and of silver, lead and iron, in copper; also of tin, lead, cadmium, and magnesium, in zinc-base die casting alloys, are typical examples.

### Analyzes Gas Engine Combustion Chamber Reactions

Other uses for the small spectrograph, in addition to metallurgical work, include detection and identification of metals in silk and other fabrics, analysis of dissolved solids in water, and analysis of glass and other ceramics for impurities.

The spectrograph has also been employed in analyzing the reactions that take place in the combustion chamber of gas engines, and in this work the new instrument is said to be especially suitable because of its small size and compactness. It is easily mounted upon an engine block in position to receive light from a quartz window fitted in the cylinder wall or head. The spectra are of sufficient length to permit accurate measurement and identification of the emission lines and bands produced by the explosion.

Under favorable conditions this instrument can be used also for quantitative work. The requirement

is that the spectrum lines of the element to be determined must be clearly separated from neighboring lines of other constituents. On materials giving relatively simple spectra the precision obtainable is said to be the same as with a larger instrument. The small Littrow is well suited to absorption analysis.

### Optical System Described

The optical system of the new small spectrograph is of crystal quartz of the "auto collimating" type, in which a prism with a metallic reflecting back is used and a single lens serves both

as collimator and camera lens. The light entering the slit is rendered parallel by the lens and is refracted upon entering the prism. Upon striking the metallic coating it is reflected back along a path nearly parallel to the entering beam. It is again refracted upon leaving the prism and is focused as a dispersed spectrum upon the photographic plate by the same lens that collimates the entering light. This design is said to permit, for a given overall length, greater focal length and linear dispersion.

Four standard slits are provided, of 2, 5, 10 and 20 microns, cut in a protected silver coating deposited on a single quartz slide. The slit widths are indicated in microns on the face of the slide. Stability, parallelism of edges and ease of cleaning are features emphasized. The plate holder is of standard Graflex type, 5 x 7 in.

## Helical Heating Element Improves Furnace Performance

**T**HE new helical heating element shown in the side walls of the Ajax box-type furnace pictured on page 38, is emphasized by the maker, the Ajax Electric Co., Inc., Philadelphia, as a distinct step forward in the design of electric heat-treating furnaces operating between 1500 and 2000 deg. F.

This element consists essentially of a heavy rod spiral made of nickel-chromium alloy. These spirals are laid in refractory supports (in the roof, side walls or hearth) in such a way as to permit the free radiation of the heat to the charge. Each turn of the spiral rests on two points only and this, it is pointed out, avoids disadvantages of heating elements which are fastened down or hung as the elements are free to adjust themselves under heat. Expansion, contraction and creep stresses are eliminated.

The shelf-like refractory supports holding the elements are provided with staggered apertures to retard the

heat flow toward the top of the furnace, thus accomplishing a more uniform temperature distribution throughout the furnace chamber. These shelves also act as a protection for the heating elements, should the work tilt forward toward the side walls and they obviate the necessity for expensive alloy guards.

The elements may be removed easily by lifting them out of the supports and this may be done while the furnace is hot.

Since the elements are not fastened down or hung in any way, the turns of each spiral can be adjusted at will, thereby offering extreme flexibility in spacing and distributing the heating elements to insure uniformity of temperature.

These design improvements are claimed to result in longer life and trouble-free furnace operation. The new heating element will be a feature of the Ajax company's exhibit at the forthcoming National Metals Exposition.

## Introduces Line of Expansion-Type Pyrometers

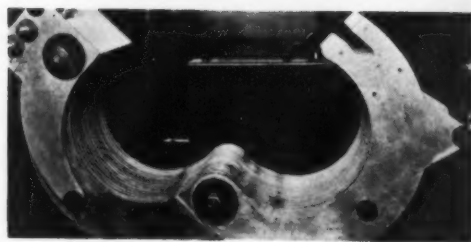
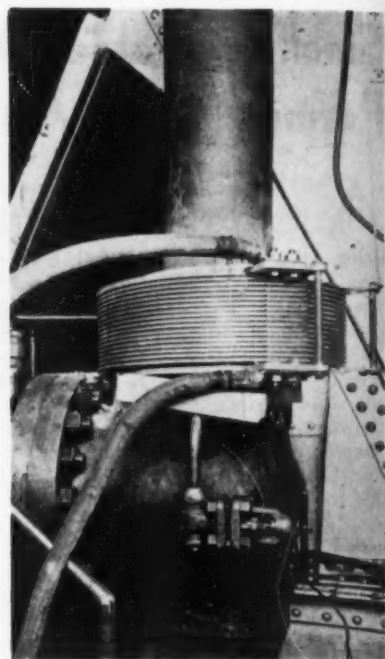
**T**HE Chevenard industrial pyrometer pictured on page 39 makes use of the difference of expansion of a rod of Pyros and the fused silica tube in which the rod is contained. The differential expansion of the Pyros and the silica is communicated through a silica push rod to a lever of Invar, which carries a pointer moving over a scale graduated to 5 or 10 deg. intervals, according to the range of the pyrometer. Pyros is an alloy developed to withstand repeated cycles of heating to 2000 deg. F. and cooling, without change in characteristics or appreciable oxidation. The instru-

ment is made by the Acieries d'Imphy and marketed in the United States and Canada by the R. Y. Ferner Co., Investment Building, Washington. It is supplied in three different temperature ranges and in five types. One of the indicating instruments is arranged to cut off the furnace heating current at a predetermined point. One of the recording instruments is equipped to give an alarm when the temperature falls below a predetermined amount and another is arranged to maintain a given temperature cycle of furnace and bath.



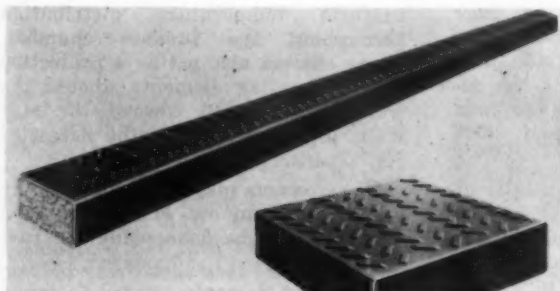


THIS small quartz spectrograph, described at length on page 37, provides a rapid tool for analysis in the case of simple spectra. In addition to metallurgical work, the instrument may be employed handily for analyzing reactions in the combustion chamber of gas engines and for analysis of dissolved solids in water, etc. It will be demonstrated at the forthcoming National Metal Congress.

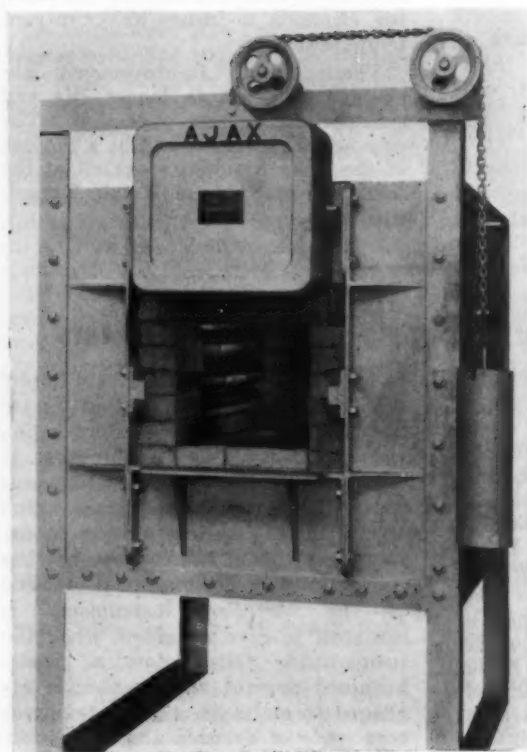


#### AT LEFT

SAFE footing for both workmen and loaded trucks on floors, platforms, ramps, etc., is embodied in the new Safety-Tred top covering made by the Truscon Steel Co., Cleveland. It is supplied in plates, blocks or plank for new construction and maintenance.



WELDED joints in 6 to 24-in. pressure piping may be stress relieved in the field by the portable electric equipment pictured above and described on page 41. Application of the device is shown in the upper view; the induction coil alone, in the open position, is pictured in the lower.



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THE helical heating element in the side walls of this electric heat-treating furnace feature elimination of expansion and creep stress, easy removal, and flexibility in spacing. Details are given on page 37.

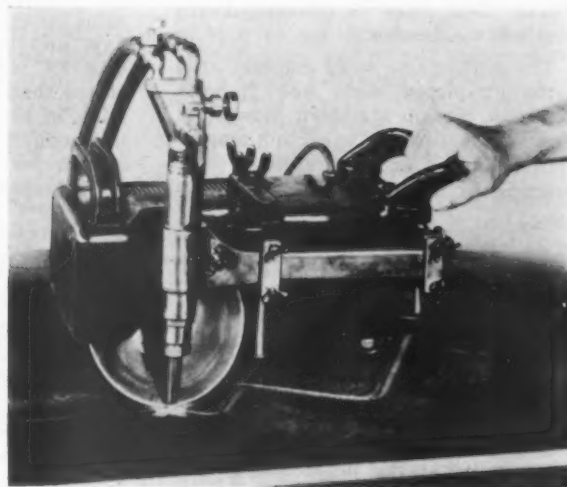


INCREASE in speed of pipe welding with savings in rods and gases features this Linde Multi-flame head, which has two auxiliary flames for preheating both edges of the vee ahead of the advancing puddle. For further details of this new development, see page 40.





**S**TUDS for hanging piping, hooks, instruments, signs, etc., may be quickly welded to steel surfaces by the portable equipment pictured above. After a stud is placed in the welding gun and pressed against the surface to which it is to be welded, an automatically timed power impulse completes the weld. As described on page 41, the flexible cables are air cooled.



**C**OMPACT, motor-propelled oxy-acetylene machine for accurate cutting of straight, circular or irregular outlines in steel plate up to 2-in. thick. Travel speed is adjustable, and change in direction may be made with unusual ease. This machine, the Airco-DB Tractograph, is described on page 41.



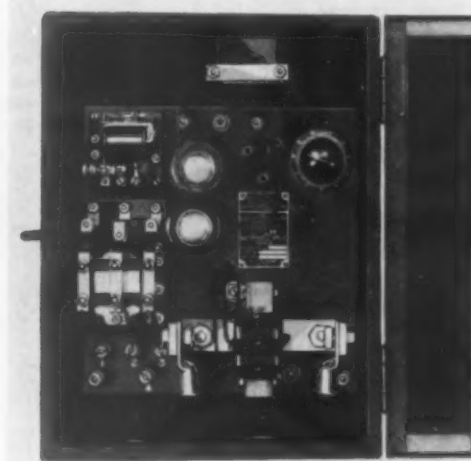
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**F**ULL - FLOATING mountings maintain alignment of the heating element within the cabinet of this unit heater and protect the element from piping strains. Construction of the cabinet and other details are outlined on page 45.



**I**N addition to study of rapidly moving parts, this stroboscope may be used as a tachometer for speeds up to 140,000 r.p.m. It is described on page 41.



**T**HIS pyrometer makes use of the difference of expansion of a rod of Pyros and a fused silica tube, as explained on page 37. Indicating and recording types are made.



**S**PEEDIER operation and increased range feature this new automatic timer for use with resistance welding machines. Details are given on page 40.

# Multi-Flame Welding Head Increases Speed of Pipe Welding

**A** NEW welding head, by the Linde Air Products Co., 205 East Forty-second Street, New York, provides three flames; a main welding flame used in the usual position and two smaller auxiliary flames positioned to preheat both edges of the vee ahead of the advancing puddle. The chief modification brought about by this Lindewelding head is a lengthening of the stroke to assure auxiliary flame preheating and a more rapid compensatory melting of the special rod; otherwise the improved technique is not greatly different from that recommended for single-flame Lindewelding.

The multi-flame head consists of a chromium-plated stem and tip for use with certain standard blowpipes. Previous features of backhand manipulation and an excess acetylene (carburizing or reducing) flame adjustment

are retained from the single-flame technique.

The nature of multi-flame Lindewelding practically restricts it to rotation welding. Its chief field of application continues to be that of overland pipe welding, although it has been used in the fabrication of bull plugs, headers and reducers for power plant piping.

It is reported that in the laying of one 30-mile stretch of new 12-in. pipe over unusually rough country, six operators averaged as high as 36.5 welds per day; on a stretch of 8-in. pipe the same operators averaged 48 welds per day, and on 6-in. pipe the average was 89 welds per operator. It is stated that in laying several hundred miles of pipe of various diameters in mid-country field a saving of 25 per cent in rods and gases was effected with proper manipulative technique.

## Improved Automatic Weld Timer Operates Faster

**F**OR use with resistance welding machines, the Electric Controller & Mfg. Co., Cleveland, has brought out the new automatic weld timer, the Folio 2, illustrated on page 39. Faster operation and increased range are features.

The new timer operates on the same principle as the Folio 1, previously described, but, it is stated, requires less apparatus, has a smaller and more shallow dust-tight cabinet and, in operation, is twice as fast as its predecessor and also the faster operation not only produces more welds per minute for a given material, but also greatly increases the number of different kinds, and the variety of thicknesses, of metal which may be welded.

In addition to its adjustable dial for time varying, this new timer is equipped with a means to supply a triple current range for a timer of given capacity. The change from one range to another is quickly accomplished by inserting a plug into one of three receptacles located on the front of the panel. By this means, it is claimed, a much more refined control of the length of time the current is on, is possible.

These two adjustable features allow selections of the best operating conditions and heat tap used. When so adjusted, the timer does not provide a definite amount of time for each weld, but varies the time in inverse proportion to the rate of cur-

rent flow, to the end that perfect welds of uniform consistency may result.

## New High-Speed Arc Welding Electrode

**F**OR economical production of high-speed, high-quality welds in the flat position the General Electric Co., Schenectady, is offering a new heavily coated arc welding electrode designated as the type W-23. These electrodes are suitable for either manual or automatic arc welding, and are said to produce equally good results on either alternating or direct current. With the latter, reverse-polarity is used.

Economy is attributed to the ability of the electrode to operate at higher speeds, in larger diameters ( $\frac{1}{4}$ ,  $\frac{5}{16}$ , and  $\frac{3}{8}$  in.) and at higher current values than those commonly in use. It is also due to the fact that type W-23 welds fuse uniformly with the side walls of the joint, thus saving the time and labor otherwise spent in chipping out slag from pockets at the line of fusion.

Smooth appearance and unusual tensile strength, density, ductility, and resistance to impact and corrosion are claimed for welds made with the new electrodes. The welds meet the requirements for Class 1 A.S.M.E. boiler code and E-10 A.W.S. tentative filler metal specifications. The electrode has been approved by the

American Bureau of Shipping for Class 1 E-10 A.W.S. specification welding in the construction of hulls and machinery subject to classification by the Bureau.

Average physical characteristic values for W-23 welds after stress relieving at 1200 deg. F., as shown by five tests, are: Ultimate tensile strength, 65,840 lb. per sq. in.; yield point, 54,460 lb. per sq. in.; and elongation in 2 in., 31.6 per cent. Without stress relieving, the average results of nine tests show ultimate tensile strength of 69,550 lb. per sq. in.; yield point of 56,355 lb. per sq. in.; elongation of 27.2 per cent in 2 in.; and impact resistance (Charpy) of 30 to 40 ft.-lb. Free-bend ductility values range from 40 to 60 per cent.

## Tool Life Extended by New Screw Steels

**B**ESSEMER screw steels made by a process said largely to eliminate abrasive elements detrimental to the cutting edges of tools have been announced by the Union Drawn Steel Co., Massillon, Ohio. It is stated that the new process does not involve change in analysis nor does it affect in any way the physical properties of the material.

Feeds and speeds are no higher than already obtainable with steels of these analyses, but important production economies are claimed through the reduction of machine shut-downs for regrinding of tools, with accompanying interruption and loss of production. Tests by the company's engineers are said to show increase of 100 to 400 per cent in tool life, and similar results in long runs in a number of screw machine plants. The new development is being employed in the production of both Union Free-cut (S.A.E. 1112 type) and Union Super-cut (high sulphur) Bessemer screw steels.

The growing popularity of pre-finished metals is responsible for the addition of a large display of articles made from these materials this year at the second annual industrial materials exhibit, to be held at the Park Central Hotel, New York, during the week of Oct. 15. The Apollo metal works, LaSalle, Ill., will have a display laid out primarily for metal stampers who are interested in getting away from the problems and costs of handling parts that require plating. A wide range of articles has been accumulated to show how deeply pre-finished metal can be drawn, how to avoid scratching the highly polished surfaces of pre-finished metals, how to solder chromium and how to improve designs by the employment of pattern metal.



## Develops Portable Equipment For Welding Studs to Steel Surfaces

**T**HE General Electric Co., Schenectady, has brought out a new portable stud welder, applications of which include welding of studs to steel surfaces for hanging piping, conduits, signs, instruments, hooks and insulating materials.

This equipment, shown on page 39, consists of a welding transformer and control mounted in a portable steel cabinet, primary and secondary cable, and a stud-welding gun. The latter holds the stud against the work under spring pressure and properly directs the welding current. Made largely of aluminum, it is light in weight, and it accommodates studs of from  $\frac{1}{4}$  to  $\frac{5}{16}$  in. in diameter and from  $\frac{1}{2}$  to  $2\frac{1}{2}$  in. long.

In operation, a stud is placed in the welding gun, pressed against the surface to which it is to be welded, and one automatically timed impulse of power completes the weld.

Split steel doors on one side of the portable steel cabinet give access to the control panel. Opening the upper door automatically removes power from the panel; adjustment of current and time for different sizes of studs are made with this upper door open. The lower door is used for servicing only.

The transformer is mounted in the cabinet behind the control panel and is connected to the power supply through a 20-ft. double-conductor drag cable. The secondary of the transformer supplies heavy current at low voltage to the welding gun through hollow, forced-air-cooled flexible cables. The cooling air is admitted at both ends of each cable and is allowed to bleed out over its entire length. The secondary windings of the transformer are also forced-air-cooled, permitting the use of the minimum of material for a given capacity; in this manner maximum portability is possible. The weight of the complete unit, less the cables, is approximately 500 lb.

A control switch in the spade-type handle of the gun controls the operation of an automatic timer located on the control panel. When the gun switch is closed current flows for a definite period only, regardless of how long the switch is held closed. The timer is adjustable from  $\frac{1}{12}$  to  $\frac{5}{6}$  sec., the exact time used depending on the size of stud being applied. Once adjusted, the timer repeats the desired duration of current flow for each weld. This stud welder is obtainable for single-phase power supplies of 25 to 60 cycles, 110 to 550 volts.

duced by a completely automatic gas cutting machine.

Measuring only  $7\frac{1}{4} \times 8\frac{1}{4} \times 16$  in., and weighing 48 lb., the machine can be easily carried about for use wherever 110 volts a.c. or d.c. current is available.

## New Stroboscope Has Wide Speed Range

**F**OR the study of rapidly moving machine parts and their functioning, the Zeiss-Ikon stroboscope pictured on page 39 is being introduced in the United States by the George Scherr Co., 128 Lafayette Street, New York.

The part in motion is observed through a rotating slit disk, the speed of which can be readily regulated and timed to coincide with that of the moving object, which will appear to be stationary and permit examination. By a slight reduction of the slit disk speed the phase under observation can be moved. The stroboscope may also be used as a tachometer, being equipped with a built-in speed indicator which permits the optical measuring of any speed up to 140,000 r.p.m. The stroboscope may also be equipped with a pair of prism binoculars, in case it is desirable to get a closer view of the object, or where close proximity may be dangerous.

The instrument may be used on a very wide range of speeds, through the changing of slit disk. The outfit is readily portable and may be either hand-held or tripod-mounted.

## Tractograph, Hand Guided, Cuts Intricate Shapes

**T**HE Tractograph recently added to the Airco-DB line of oxy-acetylene cutting machines manufactured by the Air Reduction Sales Co., Lincoln Building, New York, is designed to provide a simple means for accurately cutting steel plates and slabs up to 2 in. in thickness into shapes having straight, circular or irregular outlines and extending over practically unlimited areas.

This machine, illustrated on page 39, is a small, compact, motor-propelled unit which can be quickly adjusted to travel at any speed from  $2\frac{1}{2}$  in. per min. As it travels it is guided by hand along the desired contour laid out and scribed directly on the plate or slab.

A new principle in oxy-acetylene cutting machine drives is combined with other features to enable the operator to change the direction of the machine with unusual ease, making possible the turning of sharp corners and following of both simple and intricate contours with accuracy. The machine will cut beveled as well as perpendicular edges, and with the radius rod in place it will automati-

cally cut arcs or complete circles. Circles or arcs of smaller radius than the minimum possible with the radius rod can be cut with manual guidance. Also, it is capable of traveling up an incline of approximately 10 deg. on ordinary hot-rolled steel plate without slipping.

Once the operator has set the travel speed, lighted the torch and pressed the starting switch, he can confine his attention to guiding the machine. Results, therefore, depend only upon the closeness of his attention to this duty, and it is said that the average mechanic with very little practice can follow a line accurately, and after becoming proficient can make cuts at much higher speeds than with hand-torch cutting attachments commonly used. It is claimed, furthermore, that work done with the Tractograph will be of higher quality, for the torch in addition to being held always in correct position relative to the plate is automatically moved along at a uniform speed throughout the extent of the cut. An experienced operator can make cuts with the Tractograph that are virtually as smooth as those pro-

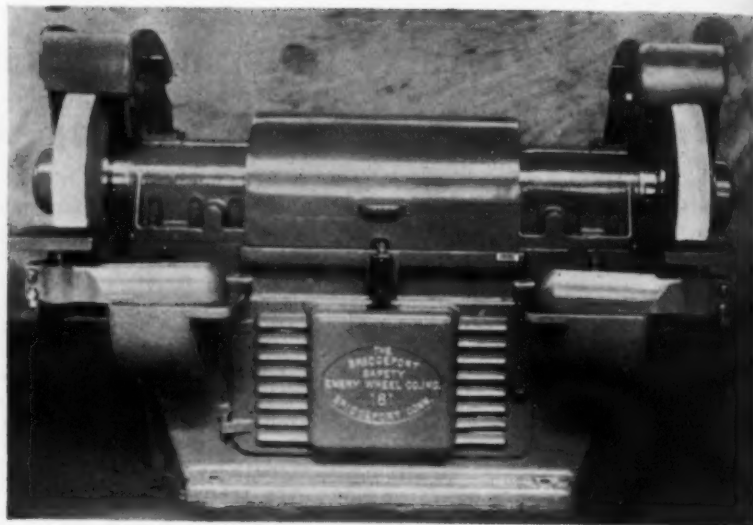
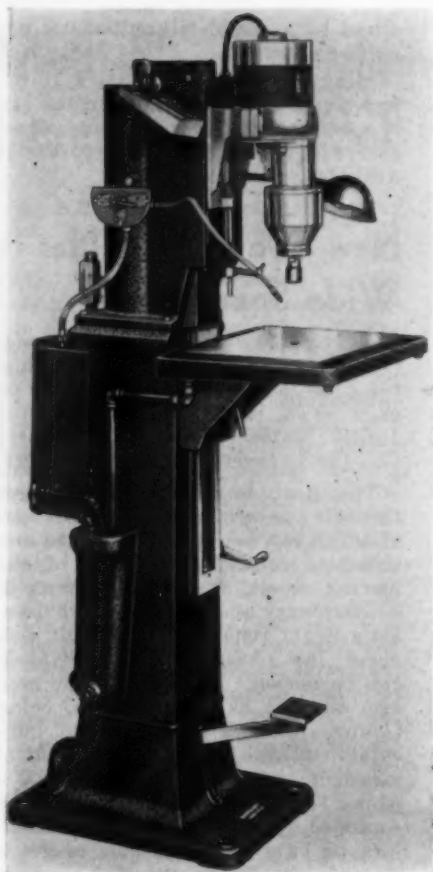
## Weld Stress Reliever For Pipe is Portable

**A**N electric weld stress reliever for normalizing welded joints in pressure lines employing pipes ranging from 6 to 24 in. in diameter has been built by the Detroit Electric Furnace Co., 825 West Elizabeth Street, Detroit. The design is adapted especially for field work. Jointed rings of various diameters are provided to fit the pipe. Weld annealing is with special, hinged induction coil protected by suitable, hinged insulating shield. The coil in both open and closed position is shown on page 38. The heat is applied to the areas to be stress-relieved to predetermined values.

A special transformer is employed; this, with the necessary control equipment, is hand truck mounted. Speed, as well as precise control and cleanliness is an advantage claimed.

Quality Tool & Die Co., Indianapolis, has moved into its new quarters at 122 N. Noble Street. Additional equipment has been installed.





SPEEDS up to 9500 ft. per min. are obtainable, and individual wheel-spindles facilitate changing of V-belts. Other production advantages of this grinder are given on page 45.

AT LEFT

THESE tapping machines have features of unit-adjustment and tap rotation designed to reduce non-tapping time to a minimum. These features are outlined on page 44.



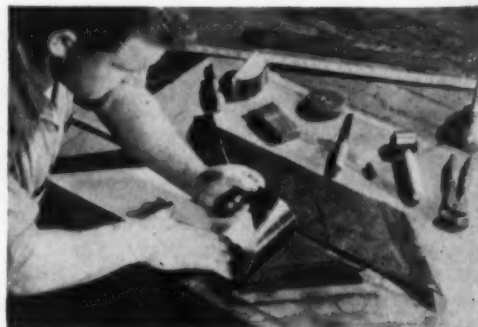
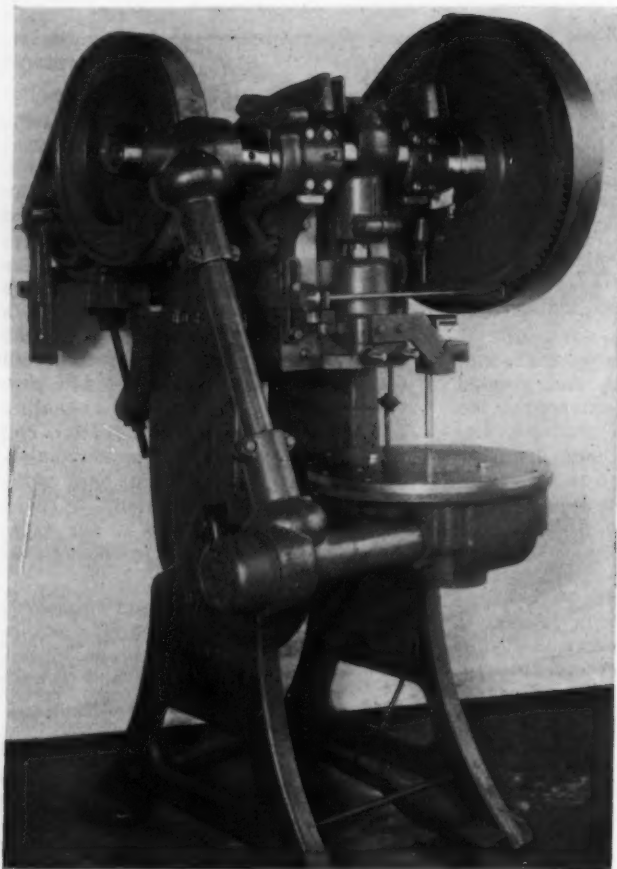
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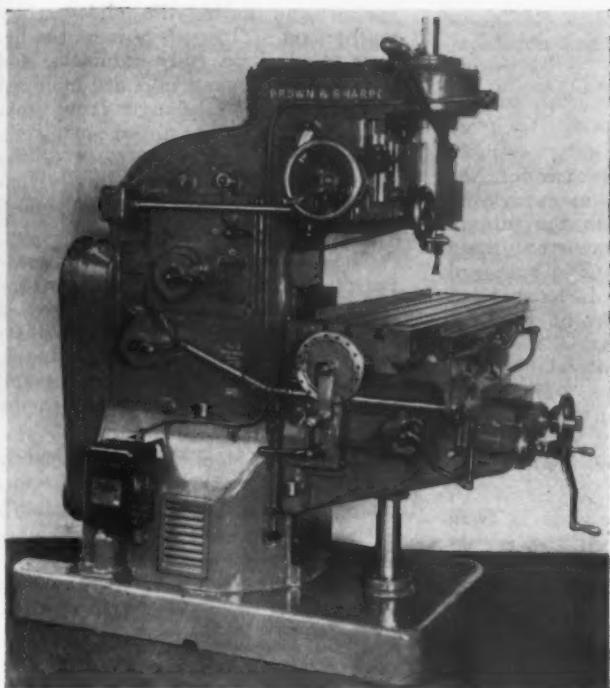
COMPLETE housing of this dial press-feed assures operating safety. The design is such as to permit ease of changing tooling. This equipment, described on page 45, is adaptable to any make of press.

AT RIGHT

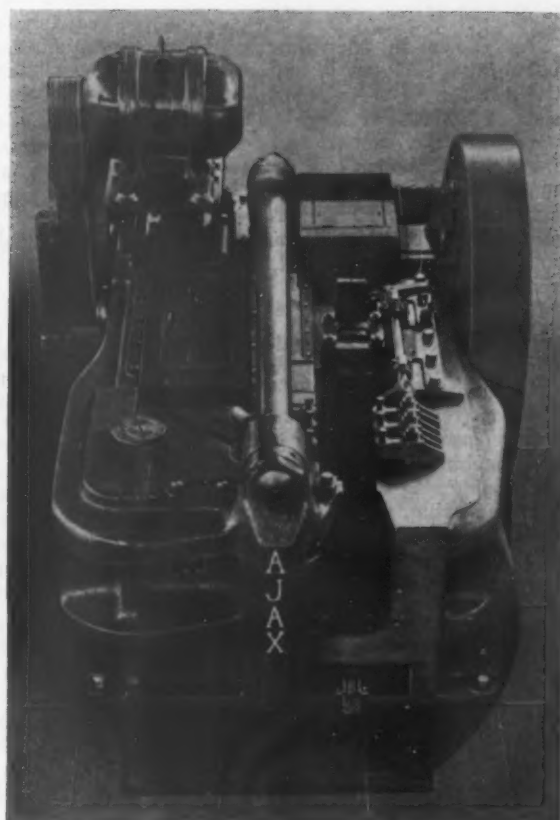
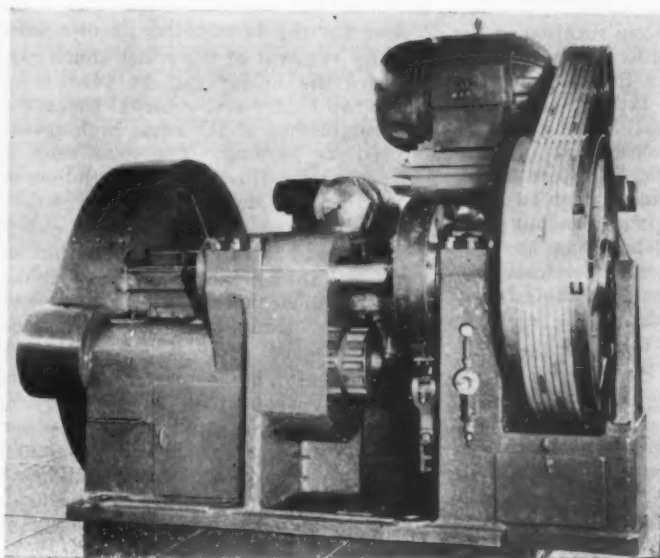
APPLICATION of rubber belt treatment designed for either the making of endless belts or overcoming the opening of seams in step belt joints, outside seams of which frequently open up under severe service. This Plylock joint involves a countersunk reduction of belt thickness at the seam and filling the vacated space with a cushion of rubber, reinforced with bias fabric vulcanized into position. Patents applied for by the B. F. Goodrich Co., Akron, Ohio.

THE bench-type filing machine shown above, a new product of Grob Brothers, West Allis, Wis., files material up to 4 in. in thickness. The file chain can be inserted into openings as small as  $\frac{3}{8}$  in. diameter. Quick lever control of file chain tension, through a downward cam movement of the idler sheave, is featured. The table is of tilting type. Three speed V-belt drive, with a positive drive to the endless file chain, is employed.

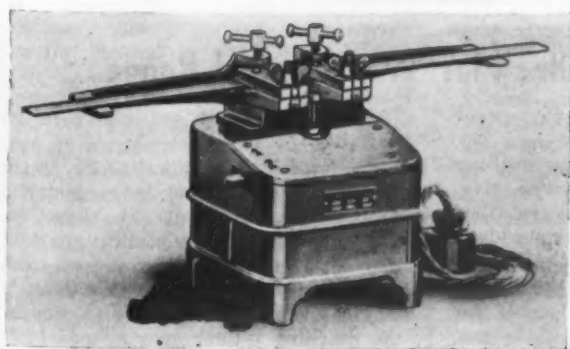




AT LEFT  
**A**DDING to such essential advantages as have been incorporated in its previous models of vertical millers, Brown & Sharpe present the new No. 2 as its solution of vertical milling problems requiring a wide range of utility. A description is given on page 44



**I**NCREASE in both output and quality of forgings is attributed principally to employment of an air clutch, which is housed within the flywheel of the new Ajax forging machine pictured above and at left. Operating conveniences have also been added, as outlined in the description on page 44



AT LEFT  
**B**AND saw blades and other flat stock may be jointed quickly with this electric brazing machine. The blades are pointed and beveled to a knife edge, then edge-lapped, and clamped into position. Simultaneously the stock and a piece of spelter are heated. As soon as the spelter melts, the current is turned off, the brazed section is compressed between the jaws of a special tool and reheated for annealing. Four sizes, for stock up to 3.35 in. wide, are built by the Eisler Engineering Co., Newark, N. J.



## New Line of Forging Machines Incorporates Air Clutch

**T**HE Ajax Mfg. Co., Cleveland, has announced a new line of air-clutch forging machines, built in seven standard sizes rated from 2 to 7-in., inclusive. Rapid operation, greater rigidity and improved alignment, resulting in increased output and better and more uniform forgings were major objectives in developing this design. As compared with earlier models, increase in output as great as 25 per cent on the same forging is reported, this increase being attributed to improved operating conveniences generally, but principally to the employment of an air clutch. This clutch was described at length in THE IRON AGE of Nov. 16, 1933.

As shown in the illustration on page 43, the clutch is housed within the flywheel of the machine. It consists of a series of large disks, alternately of alloy cast iron and friction-faced steel, which are forced into contact by the direct action of an air-actuated piston. The pick-up is instantaneous but is without shock or impact, resulting, it is said, in marked reduction of maintenance.

The clutch is engaged by a foot pedal control without fatigue of the operator. At a predetermined point in the operating cycle the air is exhausted, releasing the clutch; and an air released, spring-set brake stops the machine on the open stroke. It is possible also to "inch" the machine for die setting, saving a great deal of time and exertion, particularly where it is necessary to bar over heavy machines manually. The clutch also serves as an easily and accurately adjustable overload safety, through control of torque capacity by adjusting the air pressure.

The frames of these machines are rigid steel castings designed to hold their alignment and minimize elongation and distortion under the heavy operating loads. All sizes have heavy subfloor reinforcement and a large diameter, lengthwise tie-rod spanning the die-slide-way. The three main crankshaft bearings and the continuous housings and solid sleeve bearings of the earlier Ajax machines have been retained. The pinion shaft is carried in capped bearings to the rear of the crankshaft where clutch and brake are accessible and disassembly is convenient.

A feature of the 6-in. and larger machines is the use of two-stage gearing, which permits employment of a main gear and flywheel of moderate size. This high-speed stage gearing is of the continuous herringbone type running in oil bath.

Locating of the outboard bearing of the header slide beneath the crank-

shaft at the extreme rear of the frame is emphasized as providing complete accessibility to the pitman and particularly its important main eccentric pin bearing. The outboard guide of the die slide is located beneath and to the right of the stationary die seat to avoid a goose-neck effect with its attendant flexibility, and is kept free from water and scale accumulation through use of protecting shrouds. A take-up is provided on the guide bearings of both slides.

Actuation of the die slide is from complementary cams on the crankshaft. The cam slide bridges the crankshaft and cams, making for convenient assembly and disassembly, and houses the return roller support

## Tapping Machine Has Removable Unit Head with Motor

**F**EATURING idle-tap rotation in the tapping direction, R. G. Haskins Co., 4336 West Fulton Street, Chicago, presents a No. 2 tapper, shown on page 42, with the ball bearing tapping head and motor assembly fully inclosed within a rigid two-piece aluminum housing. Mounted upon two vertical shafts, which slide on long line-reamed and lapped bearings, the unit is counterbalanced and vertically adjustable; mid-frame adjustable travel stops are employed.

The ground and balanced tap spindle, complete with double cone clutch, collet and cap weighs but 18 oz. and embodies a no-float feature as a claimed basis for accurately tapped holes. The lightness of this spindle assembly is said to eliminate tap breakage in blind holes.

Two change gears give speeds of 1100 and 1750 r.p.m. Automatic reverse speed, by foot pedal release, is double that of tapping. The foot pedal has spring provision, permit-

ting the tap to establish its own lead. By removal of the collet chuck cap, acorn die holder can be substituted for tap holder and external threading accomplished at the same high speeds used for tapping. The work table is vertically adjustable by hand-crank and locking lever.

A new type cam-operated pump, submerged in tap lubricant within an upper tank in the frame casting, delivers lubricant to both the tap and the hole through a nozzle-equipped flexible hose.

One-half horsepower, 3450-r.p.m. motor, operating on 50 or 60 cycle, single phase as well as three-phase and direct current, is said to supply ample power, without overloading, to cover the tapping range from No. 10 tap up to and including 5/16 in. in steel, 3/8 in. in cast iron and 7/16 in. in non-ferrous metals.

The cast-iron pedestal frame, ample in size and weight, is finished in brown crystal.

## Vertical Miller Has Wide Speed Range

**I**N developing increased ranges of speeds and feeds for the new No. 2 high-speed vertical-spindle milling machine, the Brown & Sharpe Mfg. Co., Providence, R. I., has retained the capacity essentials of its standard No. 2 vertical, as well as the advantages to be gained through direct reading dials conveniently located for indication of speeds and feeds in use.

This new machine is illustrated on page 43.

Changes of spindle speed, 32 in number, are provided in geometrical progression in either direction. Changes are made by sliding gears in two series controlled by means of a back-gear lever and by rotating a single lever on the left-hand side of the machine. Back-gear speeds have



been increased, 16 back-gear speeds to 150 r.p.m. Speed in use is dial indicated. All speed train gears are alloy steel with integral keys. All bearings are anti-friction.

Changes of feed, 32 in number, from 7/16 in. to 62 in. per min., are effected by a single rotating lever controlled from either front or rear operating position. Dial indicates feed in use. The drive is through alloy steel sliding gears, with integral keys and anti-friction bearings, mounted within a unit assembly feed case. The automatic feed for the counterbalanced spindle head is provided with

automatic release at any point. There is also a fine hand feed with quick return.

A feature of interest is that one turn of rotating lever records a change in dial reading for speed or feed. Machine is under control from either front or rear operating position. Hand controls for transverse and vertical feeds are automatically disengaged when power feed is engaged. A new safety hand-crank is supplied for the longitudinal feed control. Either motor or belt drive is standard.

## High-Speed Floor Grinder Features Convenient Operation

A NEW floor grinder featuring high speed and added convenience of operating has been added to the line of the Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn. A description of operating design is here given, the machine itself being pictured on page 42.

Large hole wheels (Bakelite) are used with speed changes at regular intervals, three speeds in all, giving a maximum wheel surface speed of 9500 ft. per min. and a minimum surface speed of 8000 ft. per min. The wheel is used down from 24 to 15 in. in diameter, leaving stubs of only 15 in. diameter by 12 in. hole. Speeds are governed by the spark breakers which should be kept in close proximity to the wheels.

Speed change is governed by the largest wheel; when it reaches a point where a speed change should be made an alarm is sounded notifying the operator that he must shift belts to the next higher speed. The mechan-

ism is interlocking so that it is impossible to speed the largest wheel faster than 9500 surface feet.

An individual spindle is used for each wheel; these are coupled together and driven from a common sheave on the right-hand spindle. The result is that the V-belts are readily and quickly changed by loosening and sliding back the split half-coupling to permit passage of belts.

Each spindle is carried in two heavy-duty Timken roller bearings with housings sealed against foreign matter and the loss of lubricant.

The 10-hp. 1800-r.p.m. motor is movable for regulating belt tension and changing speeds by a lever having sufficient purchase to readily move the motor, yet not sufficient purchase to produce an excessive tension. The motor is set upon an incline to facilitate this adjustment and quick clamping is provided for locking. The net weight of the machine is approximately 4450 lb.

## Dial Feed for Presses Completely Inclosed

A DIAL press-feed in which every moving part is completely housed to assure operating safety and so designed that tooling jobs can be interchanged with the ease of changing ordinary die sets, has been placed on the market by the Federal Press Co., Elkhart, Ind. The dial-plate is independent of the indexing mechanism and is easily removed. Any number of inexpensive dial-plates can be used, and complete protection from dirt, chips and the pieces being run is featured. The dial is said to be skid-proof, although not employing brakes, locking pawls or such devices for stopping the dial correctly. It is also possible to index the dial one-fourth of the revolution of the crank-

shaft, allowing longer rest or loading periods. The equipment is specified as adaptable to any make of press. The feed mounted in position on a press is illustrated on page 42.

## Unit Heaters Have Full-Floating Mounting

IMPROVEMENTS affecting quietness, appearance and reduction of vibration feature the new No. 3 model unit heater illustrated on page 39, brought out by the Fedders Mfg. Co., Buffalo. The new series comprises a complete line of capacities up to 1200 sq. ft. E. D. R. steam. Efficiencies of heat transfer, aid velocities and final outlet temperatures are balanced one with the other. The full floating mounting, within the cabinet, elimi-

nates stresses. Cabinets are welded into one piece with the reinforcing members to provide strength and rigidity. The sturdy cabinet together with streamline tubes, patented fins and resilient motor mountings eliminate resonance and isolate vibration. Full floating mountings maintain alignment of the heating element within the cabinet and protects the element from piping strains.

## Canada Buying More American Machinery

WASHINGTON, Sept. 25.—Canadian demand for United States industrial machinery has shown notable improvement in recent months, according to a report from Damon C. Woods, United States consul at Toronto, made public by the Commerce Department.

While the mining branch has been the most active, with gold companies the chief buyers, other branches, notably the textile, automotive, metal working and printing industries have installed new equipment. The replacement needs, accumulated during three years of depression. Mr. Woods stated, have laid the basis for most of the orders and the turning of losses into profits under the spur of revived trade has caused the orders to be released.

During the year ended June 30, 1934, Canada imported machinery valued at \$15,985,518, of which \$11,797,750 originated in the United States and \$2,394,929 in the United Kingdom. The respective totals for the preceding fiscal period were \$11,588,541, \$9,326,753 and \$1,688,458. The largest single item in Canadian machinery imports, the report showed, was textile machinery, of which shipments valued at \$2,613,674 came from the United States in the 1933-34 period, an increase of 86 per cent over the preceding fiscal year's total.

## Power and Mechanical Engineering Exposition

INCREASING markets for mechanical engineering equipment which will save power costs are intensifying activity on the part of exhibitors at the Eleventh National Exposition of Power and Mechanical Engineering. The exposition, which is held biennially, takes place this year at Grand Central Palace, New York, during the week of Dec. 3. The show will supplement by actual demonstration in terms of materials and machines a number of the headline topics which will be presented in papers delivered before the mid-winter meeting of the American Society of Mechanical Engineers. The A.S.M.E. as usual will hold its sessions in the Engineering Societies Building, New York.

# Mill Engineers Survey Mechanical,

**F**OR the thirtieth time in as many years the members of the Association of Iron and Steel Electrical Engineers have met to discuss the operating problems which have been examined in various industrial plants during the previous 12 months. Their convention occupied a three-day period, which began Sept. 18, and took place at Cleveland, the sixth city in steel output in the United States.

The program was extensive, and the technical sessions not only dealt with improvements and refinements in electrical equipment, but included a variety of allied subjects. The following abstracts from the papers presented deal with developments, applications and future possibilities of equipment and processes which are believed to have a broad general interest.

## Progress in Cold-Rolling Wide Strip

In reviewing the developments in rolling equipment during the past year it was pointed out that the dominant activities were in the line of cold-rolling equipment for broad strip, and particularly for strip which is to be tinned. Stephen Badlam, consulting engineer of Pittsburgh, summed up his views on this subject by stating that the past year has been occupied in a consolidation of the gains of the several preceding years. However, there were no outstanding developments brought to the public notice. The improvement consisted principally of an extension and refinement of technical developments which were already familiar.

For the present, improvements are to be looked for in the direction of meeting increasingly rigid specifications for quality and in improvement in the economy of operation, principally in those items of cost not directly chargeable to rolling.

## The Problem of Rolling Wider Strip

The great problem of the hot strip mill that is still left to the future for solution is that of the rolling of sheets or strip in automobile body gages up to somewhere in the vicinity of 100 in. wide. Whether it will be done by means of rolls of that length and corresponding motor horsepower, or whether some method of spreading a narrower strip to that width will be adopted is something that all in the industry would be glad to have light upon. The demand is already

here and it is more than probable that the equipment will be devised. How it will be accomplished the industry has yet to ascertain.

In speaking of lubricating problems, Mr. Badlam mentioned that the use of anti-friction roll neck bearings has shown a continuous expansion during the past year. This greater use not only has been applied to the backing rolls of four-high mills, but also to two-high mills. This latter use is being accelerated by the application of small O.D. roller bearings of the quill type, which have rendered it possible to maintain a reasonable ratio of roll neck to body diameter.

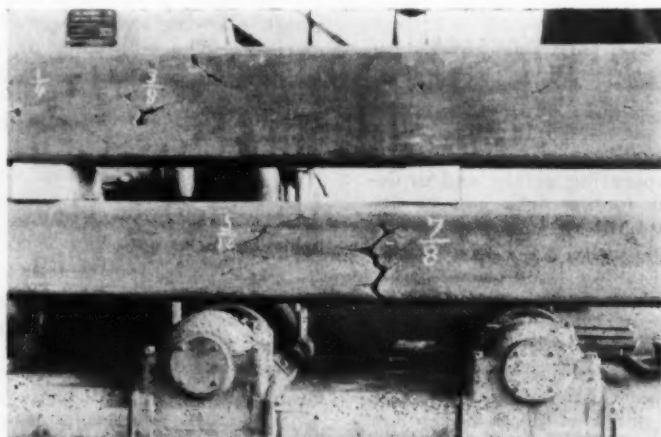
## Use of Oil Film Type Bearings Expanding

An expansion in the use of bearings of the oil film type (sleeve bearings finished to an extreme degree of precision) has continued. There are now some 125 bearings in 32 stands in 10 different mills in use. Some four or more stands of four-high hot mills are currently equipped with this type of bearing, and some 12 stands of cold mills are likewise equipped, included in which is one five-stand tandem train complete. There are also scattered applications to two-high and to three-high mills. Bearings of the syn-

thetic resin type are also coming into extended use with highly satisfactory results in two-high mills, ranging from wire rod mills to 44-in. slabbing mills, and including conventional sheet mills and in three-high water mills.

The current status of electrical equipment for high-speed precision merchant mills was presented by R. H. Wright of the general engineering department of Westinghouse Electric & Mfg. Co., East Pittsburgh. There have been a number of major changes in the methods of rolling various steel products during recent years, as exemplified by innovations in the forming of beams, sheets and tin plate. At the same time a more gradual change has taken place in methods of rolling merchant sections. Fundamentally, the rolling of merchant sections is still an art rather than an exact science, and the skill and experience of the roller play an important part in the successful performance of the mill. Further development will necessarily come through a greater emphasis on engineering analysis and less dependence on practical skill and rule-of-thumb methods.

Mr. Wright pointed out that the gradual evolution of merchant mill design, beginning with the single stand



Two blooms of nickel-molybdenum steel which would normally be regarded as scrap. The figures are the depths of the defects in inches.



# Lubricating and Electrical Developments

slow-speed hand mill, has resulted in the development of the Belgian mill, cross country mill, semi-continuous mill and continuous high-speed mill. Existing installations include all of these types. A considerable number of mills are 15 to 20 years old, and the changing demand has made many of them obsolete except for a limited range of product. More recent installations are designed to roll a wider range of product at speeds ranging up to 2100 ft. per min. With this array of equipment, steel makers are now confronted with the problem of meeting the demand for much closer tolerances on many sections and at the same time securing unit outputs which will make the operation profitable.

## Trend Toward Continuous Merchant Mill

Mills installed recently have been either of the continuous or semi-continuous type. At present it appears that as older mills are to be replaced the tendency will be to use more of these two methods of rolling. Consequently, fewer mills will be required in the future due to the greater output per mill.

With a continuous mill having a separate motor on each stand, an accurate knowledge of reductions which

can and will be used is required in determining the proper motor speeds and horsepower ratings. Such ratings can be selected to include a margin for all contingencies, but unless the proper speed ranges are selected the mill performance is distinctly limited.

Mr. Wright continued by showing that the determination of rolling schedules requires close cooperation between the engineers, the roll designer and the roller. Since different rollers use different rolling practice, the schedules as laid out are usually not followed. It may seem impracticable to the average roller to roll merchant bar in accordance with predetermined schedules of drafts and speeds, as is done, for example, on certain types of beam mills, or as is done with rod mills rolling only a few sizes of product. However, it does seem possible that as mill speeds increase and tolerances grow smaller some such procedure will be necessary.

## Developments in Vertical Rolls

The type of edging stand and method of drive is increasingly a subject for considerable study. The present tendency seems to be toward the use of vertical rolls powered as heavily as the adjacent horizontal stands.

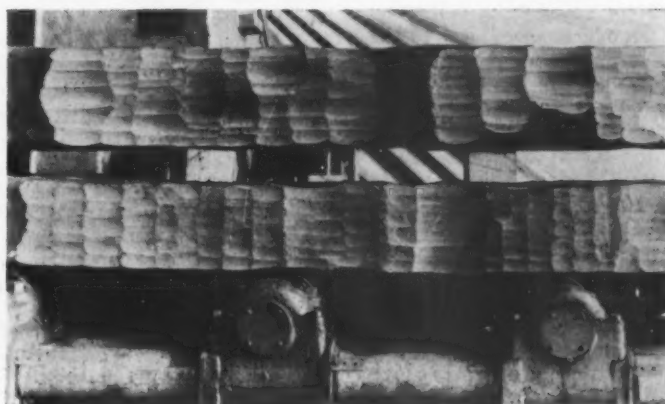
The application of considerable power to small vertical rolls introduces mechanical problems. In a number of cases the rolls have been driven from below by means of right-angle drives and vertical pinions. In some installations the right-angle drive has been eliminated and vertical motors employed. In this type of structure the rolls, pinions and motor are all carried on a vertical frame. The motor is totally inclosed, force-ventilated, and its rotor is supported, as in a vertical waterwheel generator, by a Kingsbury thrust bearing at the top and a guide bearing at the bottom. As a precaution to prevent critical vibrations in such structures, tubular bracing is usually employed to insure that the lowest critical speed of the structure is well above the maximum operating speed.

Speed control and motor speed regulation are features which always receive considerable attention, especially when the mill is to roll a wide range of product at high speed. For such mills all or a majority of the motors are direct-current machines with speed ranges by field control of at least two to one. All motors are controlled from one or two stations in the mill pulpit.

Continuing, Mr. Wright brought out that the refinement of speed regulation required for successful operation depends upon a number of factors. Mill practice has varied considerably during the past. Experience has shown that an extreme refinement of motor characteristics is not required for continuous mills rolling narrow, flat material at high speed. It is easy to provide for loops between the stands, and as long as the hot metal is prevented from coming under tension the size and shape of the loops seem to have little effect on the product. With good inherent motor speed regulation, a well-designed high-speed mill will run with little attention from the pulpit operator.

## Where Accurate Speed Adjustment Is Necessary

For rolling merchant stock, such as bolt and nut stock and similar light sections, to close tolerances in a mill of this type, very accurate adjustments of speed and roll setting are required. Because of the high speed, the metal is finished at a high temperature. A very slight tension between stands in the finishing train



Same blooms as ones on opposite page after salvaging operations on Bonnot-Lentz billeteer.



will spoil the section. If the loops are too large the bar will be scratched by the guides. In the roughing end of the mill it is necessary to run with a certain "looseness" between stands. A slight kink in the bar, caused by overfeeding of the preceding stand, can easily cause the soft bar to catch on the guides, resulting in a cobble. If the bar is under tension at any point, even for an instant, that part of the finished bar will be undersize. Therefore, the rolling of accurate merchant bar is considerably more difficult than rolling hoop or band stock at the same or greater speeds.

Good speed regulation characteristics are actually more essential for the roughing stand motors than for the finishing stands. Between the finishing stands changes in the loops indicate to the operator any variations in speed. At the roughing end of the mill it is more difficult to obtain loops which will guide the operator, and it is essential that the motor speed vary as little as possible with load and that the amount of adjustment be kept to the minimum. This is especially true where some of the roughing mill motors drive two stands, thus imposing four changes of load for each billet.

Of the three tandem merchant mills now in operation one has automatic speed regulators for all motors. The principal reason for using automatic speed regulators is to make it possible to raise and lower the speed of the entire mill without changing the bus voltage or disturbing the speed adjustments of the individual motors.

Considerable attention has been given to the design of small auxiliary planishing stands known as precision mills. Such mills are used to improve the accuracy of round stock as delivered from the main mill. They are usually driven by adjustable speed motors of less than 50 hp. At first it was believed that it might be difficult to synchronize such precision stands with the main mill. However, experience has shown that the speed adjustments are not critical and that a very simple electrical system is quite satisfactory.

Mr. Wright also included a brief description of present practice as regards to shearing and coiling merchant products as they leave a continuous mill. As a conclusion it was stated that much of the mechanical and electrical ground work leading to a general improvement in merchant mill practice has already been completed. Sufficient experience has been gained to show that electrical and mechanical equipment can be coordinated to meet the requirements of high-speed precision rolling as the occasion arises for replacing older equipment.

#### Need for Simplicity Is Stressed

Whether the design of mills is to include regulators or not is still a subject of considerable discussion. In commenting on Mr. Wright's descrip-



High-speed steel billet showing the results of extensive salvaging operations. About 135 lb. of metal was removed in 1 hr. 50 min.

tion of high-speed precision merchant mills, L. A. Umansky of the General Electric Co., Schenectady, N. Y., stressed the need for simplicity instead of elaborate electrical equipment which may not be needed, or even may be undesirable. He stated that in the greatest majority of cases the question of speed regulation, that is, the change of motor speed from full to no load, has been overstressed, due to the lack of a thorough understanding of electrical phenomena. As a result of this many expensive and elaborate synchronous-type regulators have been purchased and installed. Such equipment did all that was expected; that is, the speed relationship between stands was held at a present ratio, but there remained the problem for someone to solve of determining what the ratio should be. As regards to roughing stands the operator still has to rely on load indicators and by using these indicators as a criterion to move a rheostat. Whether such a rheostat is directly in the motor field or is used for the setting of a speed regulator does not matter much to the operator. However, in the former case a less expensive and simpler type of equipment can be obtained.

The pioneer continuous merchant mill was 14 in. in size and was installed in the Pittsburgh territory in 1924. The delivery speed of this mill is up to 3000 ft. per min. and the speed range of the various motors is as high as five to one. However, none of the several driving motors is equipped with any speed regulators, but operating results are even today eminently satisfactory.

In 1926 one 9-in. and one 10-in. continuous merchant mill were installed by the United States Steel Corp. in the Chicago district. Here again none of the driving motors was provided with speed regulators, but the results were equally satisfactory.

As regards to the use of precision vertical roll drives, any elaborate synchronous tie regulator does not solve the problem either. The proper criterion of proper speed of the vertical roll motors is its load. Therefore, a drooping speed characteristic is required, and once this is provided the need of a speed regulator is not always apparent.

The facts stated above were summed up by Mr. Umansky when he stated that the use of speed regulators is very limited indeed. It is much wiser in most cases to merely provide space for future installations of these regulators if experiment shows that an installation is necessary rather than to invest in the equipment at the outset. By so doing much simpler equipment will result, and better satisfaction will follow as simplicity of the apparatus is the first requisite of a successful steel mill installation.

Another interesting observation on Mr. Wright's paper was presented by T. B. McElray, superintendent of light and power, Carnegie Steel Co., Youngstown. He stated that, in the application of regulators to steel mill main drive motors, observers at his plant found that one thing was very important, namely, the time required by a regulator to correct the speed of its motor. The first type of regulator was tried on a 12-in. bar mill and was of the carbon pile type. While the variation of maximum to minimum pile compression occurs in a fraction of a second, this time represents a gradual process as compared with the time required for the closing of the contacts of the vibrating regulator. As the increase from friction load to rolling load is often great and almost instantaneous in the case of a motor driving one roll stand, the performance of the carbon pile type of regulator was not satisfactory.

#### Synchronous Vibrating Type of Control

The application of the synchronous vibrating type of control has proved much better. The operators in one mill use the regulators on roughing stands on all orders. Near the finishing end of the mill, however, this is not always the case, especially at high speeds. Some shapes seem to re-

quire a change in motor speed due to temperature or mechanical reasons. For example, a bar is proceeding with a normal loop between two stands and a greater loop suddenly forms. The operator must then speed up the motor until the loop again becomes normal and then slow down the motor to correct the rolling speed in order to avoid a pull which would stretch the product. To accomplish this with the regulators in service the operator has to operate a master switch which in turn runs a small motor, which, through a belt drive, changes the ratio of a Reeves drive. All this inserts an element of time and uncertainty of the exact amount of speed change which is disastrous to a quick and safe reduction of the loop to its proper amount. Therefore the operator prefers hand control, because with the hand-operated vernier rheostat he can obtain a quicker and a more definite response. The electronic regulator, which is now in the development stage, may in the future offer a solution to many of these difficulties.

Mr. McElray concluded by pointing out that in building high-speed continuous mills the engineers should avoid driving two roughing stands with one motor and should try to stay as close to the two-to-one motor speeds as possible. It is believed that with this arrangement a far better regulation could be obtained.

#### The Growing Demand for Closer Tolerances

The next discussion concerning rolling mills consisted of ways and means of meeting the increasing demand for merchant mill products rolled to close tolerances. Such products are supplanting cold drawn and other types of manufactured products. At the Struthers plant of the Youngstown Sheet & Tube Co. rounds are now being produced with tolerances within 0.003 in. across the shoulders. The horizontal bearings

used for this production consist of independent thrust bearings which are placed on the roll neck extensions. The end travel is controlled to within 0.001 in. by this procedure.

At the Canton plant of the Timken Roller Bearing Co. it was first shown to be feasible to commercially hot-roll precision rounds economically. A description of this equipment and a presentation of other developments under the general heading of Precision Rolling Mills were given by S. M. Weckstein, assistant chief engineer of the Canton plant. In developing his subject Mr. Weckstein stated that the high-speed production of strip and sheets held to close tolerances on gage was made possible by the modern backed up mill. Anti-friction bearings have played a large part in this development. The ability of the bearings to operate at uniform temperatures at the various speeds required in the continuous mill made precision rolling possible. In addition, the large reduction in power costs of rolling and the reduction in bearing wear have made the anti-friction bearing a paying proposition in this highly developed precision mill.

Recent developments in general industry and especially in the automotive industry have brought forth a demand for similar or even greater

rolled in merchant mills. Unfortunately this type of mill had not kept pace with the general development toward greater precision. The result was that a number of companies that have been able to produce a product held closer than standard commercial tolerances have generally enjoyed a greater volume of business and have created a demand for closer tolerances. The fulfillment of these requirements can only be met by proper mill practice, suitable mill arrangement and a proper type of equipment.

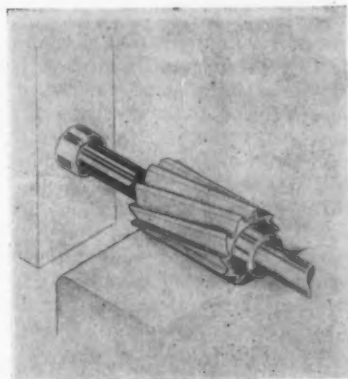
Good merchant mill practice requires a proper heating of billets, a control of scale, the elimination of undue stretching and twisting of the material during rolling, the control of temperature during rolling and an efficient handling and cooling after the product leaves the mill.

The arrangement of the mill depends entirely on the range of products, size and diversity of orders and the size of the plant. The continuous mill and the semi-continuous mill are the two general types to be considered.

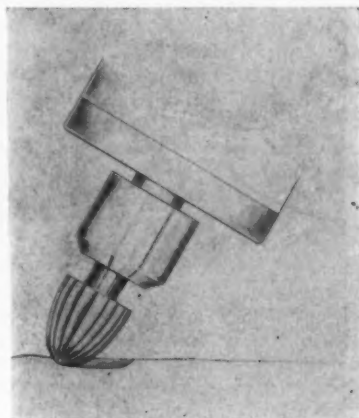
The continuous mill has the advantage of low first cost and low operating cost. It is well adapted for rolling large tonnages of strip, skelp, flats, angles and merchant bars. Such mills are justified in large steel plants where the tonnage requirements for merchant bars are large and where the range of product is limited. Specialties and jobbing orders are usually handled on other mills in the plant.

The semi-continuous mill is more suitable for high-quality products and where specialties and jobbing orders of small tonnages must be rolled on one mill. These mills are usually arranged with several roughing stands for continuous rolling and with intermediate and finishing stands arranged to permit the product rolled to run free after each roll pass.

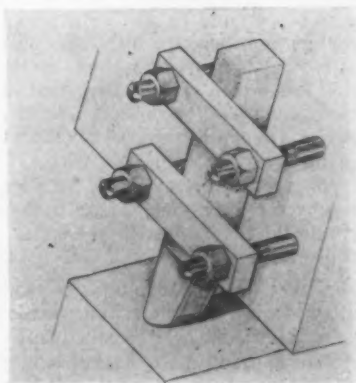
In order to obtain an accurate product on either of the above types of



1



2



3



4

Four varieties of billeting machines. The slab milling machine in (1) is still being used in some plants; (2) is a semi-vertical miller which is not used at present; (3) is a conventional clapper box planer which is currently in use, and (4) is a combined revolving head which is finding increased favor.





mills proper equipment must be available. This is even more true of the full continuous mill when the rolling mill stands are considered from the standpoint of rolling accurate rounds. The delivery of an accurate round from the finishing stand is dependent on the delivery of an exact section from the next preceding stand of the mill, and this section in turn depends on the delivery of an accurate section from the preceding stands.

In other words, the accuracy of the finished product is a function not alone of the finishing pass but of each preceding operation. In order to assure this, considerable skill is required on the part of the operator in the adjustment of the sections in the various roll stands. Since the product of the section area and the delivery speed must be a constant for all the roll stands, it can readily be seen that an adjustment in section in any stand must be accompanied by a corresponding adjustment in roll speed. A section adjustment in one stand may require adjustments in some of the other stands, both in section and roll speed. This naturally means constant vigilance on the part of the operators and a possible large scrap loss during the period of the proper setting of the various roll sections or passes.

It is in the maintenance of this accuracy and also in the relief of the operator from the necessity of constant pass readjustment that tapered roller bearings play an important part. By taking advantage of this feature it is possible to obtain perfect alinement and setting of the rolls and to maintain this setting indefinitely. It is also possible by proper design to make provision on the mill for adjusting devices which will permit a setting of the rolls or a changing of this setting by small increments in a minimum of time and without the cut and try method used on plain bearings. Once the rolls are adjusted the operator can be sure that they will stay put, and the only ad-

**T**HERE is scarcely a branch of science that has not yielded benefits to the art of metallurgy. Take, for example, chemical analysis. Out of retorts and test tubes come the exploration of the unknown as well as the control of that which we know. Just as microscopy gives us control of the unseen, so chemical analysis gives us power over the unseeable.

justments which he need consider are those required to compensate for wear in the roll passes. With this close control in the roughing stands as well as in the finishing stands a quality product is assured.

#### Importance of Easy Removal of Bearings

Mr. Weckstein stated that in a previous paper a written criticism was presented by A. G. Witting, chief engineer of the Illinois Steel Co., Gary, Ind. One observation was as follows:

"There is another factor that may have to be considered because it may affect the rolling costs more than the expense for rolls and the bearings themselves; this is the ease with which a roll change can be made. In a mill where such changes occur frequently, perhaps several times a day, it is out of the question to have bearings that must be pressed off the rolls, whether it takes 80 or only 10 tons. It is also impractical and expensive to have a great number of spare sets all made up beforehand.

"To make the application of roller-type bearings practical for an ordinary mill, even provided that the saving in power and longer length of the bearings compensate for the higher first cost, it is necessary that the bearing is assembled in one piece and that the roll neck and the inner race of the bearing are made tapered so that the bearing can be quickly slipped on the roll neck and located in its proper place by a whack of a sledge hammer, and similarly loosened, ready to be lifted off, by a hammer blow."

Mr. Weckstein continued by saying that a design such as suggested by Mr. Witting has been worked out. A two-row bearing with a tapered bore is fitted on a tapered neck. The general mounting of the bearing is the same as in previous types except that the inner filler ring is eliminated. Instead of making the inner closure integral with the bearing box a separate piece is used. It is quite possible

that in the majority of cases it will be possible to remove the bearing and box from the neck by a hammer blow.

On the 28-in. three-high bar mill at the plant of the Timken Steel & Tube Co. the top and bottom roll bearing boxes on one side of the mill are provided with lugs in which slots are machined. Special clamps fitting into the slots are bolted to the mill housing. By the use of ball seats and special washers, proper functioning of the clamps can be obtained from the push-and-pull nuts at the extreme ends. The holes in the clamps are elongated so that the clamps can be slid out of the way when a roll change is made. It is advisable to harden the faces of the slots in the lugs or to insert hardened steel liners to prevent pounding out in service.

On the Timken merchant mills and on other similar mills the pass adjustment is obtained by designing the chock at one side of the mill with an extending lug, which is fixed to the mill housing by means of a push-and-pull bolt and nut arrangement. The chocks at the opposite end of the roll do not have the lug and are permitted to float in the mill housing. In this way the setting of the roll passes is obtained from one end of the mill.

#### Twist Guides Eliminated

Considerable attention has recently been given to vertical mills. The twisting and guiding of small bars necessitate small guide clearances, and any resistance in the path of a small bar traveling at high speed may result in considerable scrap loss. These twist guides can be eliminated by the use of vertical mills. The rolls in these mills should be adjustable up and down to properly line up the passes with the preceding horizontal mills. Provision should be made for accurate pass adjustment and for longitudinal movement of the rolls with respect to each other.

Roller bearings are required in this type of mill, since they can be properly inclosed and protected against entrance of scale and water. An 11-in. vertical finishing mill of this type has been in service for about five years. The mounting of the bearings is practically the same as for the horizontal mills. The closures are more positive and fingers forming labyrinths are used. The rolls are hung from the top bearing and are easily removed. The bearings, because of their thrust-carrying capacity, easily support the weights of the roll and boxes and the thrust loads from rolling. The bottom boxes are permitted to float so as to take care of roll expansion and not to interfere with pass alinement.

The top boxes are designed so as properly to take care of the pass alinement of the rolls. The top bearing closure is designed with an extension having six threads per inch. A special bracket is bolted to the mill



housing and attached to the threaded extension of the bearing box cap by means of two jam nuts and a specially designed adjusting plate. The bracket has 23 equally spaced holes and the adjusting plate 24 equally spaced holes. By loosening the jam nuts and by tightening or loosening the adjusting plate an increment of vertical rise and fall of the roll of 0.0003 in. can be obtained. When the desired set-up is reached the adjusting plate is locked to the bracket by means of a pin inserted in the two mating holes. The jam nuts are brought up tight to hold the set-up rigidly.

#### Rejuvenating Rolls and Bearings

After reviewing actual installations of roller bearings in order to secure greater precision, Mr. Weckstein pointed out that naturally it was the object of all companies to secure as long a life as possible from rolls and bearings. It was stated that the Timken company has prepared literature describing experiments recently completed in which the life of bearings and rolls are materially lengthened. The procedure consists of immersing the rolls and bearings in constantly agitated oil baths at a temperature of 300 deg. to 350 deg. F. Therefore, after a considerable amount of service it is seemingly possible as well as probably desirable to perform a draw-back in order to secure additional service from the equipment.

#### Mechanical vs. Hand Chipping

The next subject discussed was that of mechanical billet chipping. The reconditioning and chipping of billets is usually a laborious manual process with air hammers and chisels. The development of economic machines to do this work is comparatively recent and results obtained are yet somewhat at variance. Some companies have found that the machines do not remove small spots that are injurious and are inclined to favor the hand chipping for that reason as well as other reasons, including mechanical handling and initial expense.

The chipping machines are essentially cutting machines and the integral parts consist of cutting tools. Thus it has been found difficult to patent machines, although several companies have protection on novel features. Often it has been said that the necessity for billet chipping can be laid to unfortunate open-hearth practices. However, even the most rigid of melting observations does not eliminate entirely the occurrence of seamy or faulty billets.

Naturally the air gun chipping method is expensive and often entirely unsuited to billets having very deep flaws. In past years it has been economically advisable to discard such billets rather than to attempt recovery. However, the more expensive steels of the present day cannot be lightly discarded and this fact, to-

**S**UPPLEMENTING the skill and knowledge of the unaided senses, science today brings to the metal-maker and the metal-worker almost miraculous aids which supplement their powers many fold. Consider, for example, the application of microscopy to metallurgical research and to production control. Success, they say, is dependent upon taking note of the little things. How true that is in metal technology and how valuable is this means of making the minute evident.



gether with generally tighter specifications, is making it almost necessary that efficient, easily operated and rapid billetteers be developed.

That badly scarred blooms can be rapidly renovated is illustrated in Figs. 1 and 2. To salvage by hand the two nickel-molybdenum blooms shown in Fig. 1 would run the final cost up so high that it would be cheaper to return the heat to the open-hearth. However, the same billets, shown in exactly the same position in Fig. 2, are fully conditioned and are ready for rolling.

An extreme case of bloom salvage is shown in Fig. 3. This high-speed billet, originally  $5\frac{1}{2} \times 5\frac{1}{2} \times 86$  in., is what is known as floor-annealed. The scars were so deep that over 135 lb. of metal was of necessity removed; the working time was 1 hr. 50 min. This billet was afterward rerolled and found to be perfect. A considerable saving resulted from the reconditioning, as the remelting value of this particular steel was around \$90 a ton.

#### Billet Chippers Are Reviewed

In observations regarding mechanical means for conditioning billets, G. W. Lentz of the Bonnot Co., Canton, Ohio, discussed four methods, as illustrated in Fig. 4. The slab milling machine (1) was under consideration over 18 years ago, and several installations are currently in operation. It was stated that the chief objection to this equipment is the difficulty or almost impossibility of moving the milling cutter down into a deep defect. The only method of going deeply is to start the tool at the end and cut into the defect. Thus there is considerable unnecessary loss of metal. In addition the tool expense is quite a sizable item.

In (2) of Fig. 4 is shown what is known as the semi-vertical milling method. This manner of removing metal is slow, and the tool replacement is frequent and expensive. As a

consequence very few or none of these machines is in current operation. In (3) is shown a conventional clapper box planer. This method is practical and in current use. Mr. Lentz stated that its use is justified when the billet is straight, but somewhat impractical when used on billets having irregular surfaces and curved ends caused by hot shearing. Considerable metal is lost when short, deep seams are encountered. Mr. Lentz stated also that another objection, as shown by actual operation on a high-carbon bloom at a cutting speed up to 35 ft. per min., is a serious overheating of the tool.

Mr. Lentz next described the cutting head shown in (4). This machine has a combined revolving head which is capable of acting as planer or miller. The tool can be stopped at will and used as a planer wherever the conditions warrant. At the end of the seam the head can be started to revolve, thereby giving a contour for rerolling which is similar to that obtained by the air gun method.

This machine has a flexibility which is very desirable. The operator can quickly cover all the defects on the surface of a bloom. Instead of the billet moving as in the other three methods, the cutting head moves. There are three motors connected to the cutting action. One motor controls the travel of the carriage, another elevates or lowers the tool and the third turns the tool. These three movements are all operated by a unique finger-tip control lever similar to the joystick of an airplane. The control is very rapid and is always in the direction of the tool travel.

About 150 sq. in. per min. of surface can be chipped by this method. The revolving head has six 2-in. wide cutting tools revolving at a speed of  $6\frac{2}{3}$  r.p.m., which gives 40 cutting cycles per min. The cut can be changed from  $1/64$  in. in depth to  $1/4$  in. between tool contacts with the metal. The operator can stop any one

of the six tools at the proper angle to give a planer cut with the proper rake of the tool. At the end of the planing action the head can be started to revolve. A satisfactory taper ensues, thereby eliminating the danger of overlaps during rerolling.

Of course the head undergoes considerable punishment during operation. The head is of fully hardened steel and high-speed tool cutters are used. The tool cost, however, is fairly low, as one company reconditioning seamless tube billets found its tool expense to be less than 1c. per ton.

#### Centralized Lubrication Recommended

**D**URING the second day of the convention considerable time was devoted to lubrication problems. Naturally all steel mill engineers are eager to determine the best lubricating practice and are anxious to examine new developments, for it is through the adoption of advanced techniques that the cost per ton of rolled products can be kept at a minimum.

The loss of one horsepower a year will cost the average mill about \$6, consequently it behooves mills to examine the lubrication of plant machinery as well as adopt more efficient bearings. The solution to successful lubrication lies in the adoption of automatic and centralized devices which eliminate the hit-or-miss procedures of past years when hand lubrication was the only practice known.

Good lubrication not alone demands the use of the correct grade of lubricant, but also requires that the lubricant be properly applied by a dependable method and at regular intervals. The system must not be cumbersome, nor must the piping be complex. The initial cost should be fairly low, and its operation should require the minimum of attention with the maximum of desirable results. A modern centralized system of lubrication, combined with the correct grade of lubricant having the above attributes, can now be obtained, and the monetary advantage of such installations is demonstrated by the data which are presented in Table I.

A. J. Jennings of the Farval Corp., Cleveland, summarized the advantages of such central systems as follows: Avoidance of waste lubricant, reduction of friction, lower consumption of power, increased life of bearings, reduction of lost time and money as the result of breakdowns, increased production, and complete safety. The increase in bearing life due to centralized systems has been found in some plants to be as high as 1200 per cent. Such savings cannot be lightly ignored. In addition, it is through constant production with few repair, adjustment and replacement intervals that economic production is obtained. To secure such results it is almost necessary that intermittent

lubrication by hand be supplanted by positive automatic machine installations, particularly in the modern type of equipment which is often furnished with roller and ball bearings. Such bearings have extremely high life when treated correctly, but they suffer quickly from neglect.

Mr. Jennings showed many photographs of centralized lubricating installations on all types of mill machinery. The positive delivery of a measured quantity of lubricant is in most cases accomplished by a small motor set, and at no time is the tubular conveyor in the way. Simple control features on each device are flexible enough to permit the securing of a great variety of delivery conditions to fit a large number of bearing conditions. When such lubricating devices were introduced a few years ago the steel industry was especially concerned with production costs and consequently the devices were rapidly adopted in a number of plants. The reductions of mill power necessary for operation often are as high as 15 per cent.

#### Standardization of Rolling Mill Lubricants

The great problem now facing petroleum technologists is the standardization of rolling mill lubricants. Not all oils are suitable for use in a circulating system. During the pumping operation, the circulation through the pipes and the churning and agitation in the gear case subject the oil to considerable punishment. It must, therefore, possess certain characteristics to withstand these actions. Among the desirable characteristics are correct viscosity under the operating conditions, fairly good fluidity at low operating temperatures, a min-

imum tendency to oxidize, good demulsivity, a low sludge formation value, a low tendency to foam, and above all a high film strength. It is more than likely that oils will be developed possessing higher values in the above characteristics in the coming years, as the efficient operation of modern machinery has already brought forth a demand for such improvements.

#### Electrical Equipment of Inland and Otis Mills Discussed

**S**OME of the more recent developments in electrical equipment for steel plant operations were discussed by three speakers who reviewed electrical installations in two outstanding plants in an electrical and mechanical division session, which was presided over by F. D. Egan, electrical superintendent, Bethlehem Steel Co., Lackawanna, N. Y. Electrical characteristics of the main drive motors at the Inland Steel Co. was the subject of a paper by R. W. Davis, electrical engineer, Allis-Chalmers Mfg. Co., Milwaukee, Wis. As the Inland's 76-in. continuous hot-strip mill has been given considerable publicity, Mr. Davis did not read his paper, but instead made some interesting comments regarding this mill. An outstanding feature of the mill, the author pointed out, is that the rolls of the six finishing stands can be changed, the stands can be set up for a change in draft and the mill put back in production in 36 min. As this mill turns out products in a wide range of gages extending from strip to floor plates, drafts take range from 5 to 50 per cent. Motors and generators are under a close speed regulation and special attention is paid to overloads.

(Continued on Page 86)

Table I. Showing the Economy of Centralized Lubrication for Sheet Bar and Merchant Mills  
General Costs With Hand Lubrication:

Electric power cost per ton.....	\$0.12 to \$0.25
Bearing and labor cost per ton.....	0.025 to 0.06
Lubricant (roll necks only) cost per ton.....	0.008 to 0.025
Production 12,000 to 30,000 tons per month.	

#### Average Costs With Good Rolling Practice:

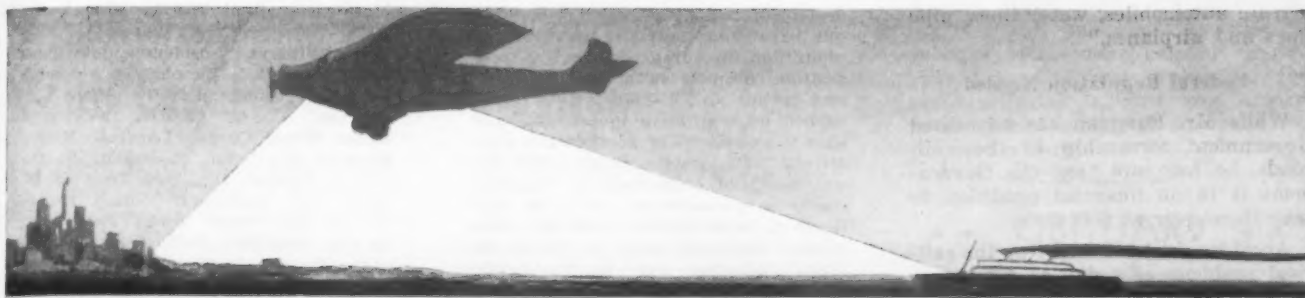
Hand Lubrication per Ton	Centralized Lubrication per Ton	Savings per Ton
Power ..... \$0.15	Power (less 20 per cent)..... \$0.12	\$0.03
Bearings ..... 0.03	Bearings (less 90 per cent).... 0.003	0.027
Lubricant ..... 0.01	Lubricant (less 10 per cent) .. 0.009	0.001
Total ..... \$0.19	Total ..... \$0.132	\$0.058

Total Cost for	Total Cost for	Monthly Savings
15,000 tons..... \$2,850	15,000 tons..... \$1,980	15,000 tons..... \$870
20,000 tons..... 3,800	20,000 tons..... 2,640	20,000 tons..... 1,160
30,000 tons..... 5,700	30,000 tons..... 3,960	30,000 tons..... 1,740
Average installed cost of centralized lubrication.....		\$3,000

#### Average Yearly Return on Centralized Lubrication Investment

Tons per Month	Yearly Saving	Yearly Return
15,000	\$10,440	348 per cent
20,000	13,920	464 per cent
30,000	20,880	696 per cent





## THE NEWS OF THE WEEK

### Eastman Believes Railroads Can Prosper If Potentialities Are Fully Utilized

**A**DDRESSING the National Petroleum Association at Atlantic City, N. J., last week, Joseph B. Eastman, Federal coordinator of transportation, expressed the belief that if improvements in the art of transportation which have already been made and those pending are rightly utilized, the country is on the verge of new developments in railroad and other transportation which will have benefits of wide range and reach. They will, for example, he said, be of considerable benefit to the capital goods industries, which are greatly in need of help.

Stressing the investigations which his own staff is making, he referred to surveys of opportunities for pooling traffic; using trucks or buses as a supplement or a substitute for rail service; making trains shorter or more mobile with increased frequency of service; introducing light-weight equipment and demountable containers capable of transfer from car to truck; reducing the costs and delays of terminal operations; simplifying freight rates and adjusting them to modern competitive conditions, and adjusting passenger service and rates to the needs and desires of the traveling public.

Mr. Eastman said that through advisory committees and equipment manufacturers, particular attention is being given to such matters as design of new types of equipment and the use of light-weight metals in their construction. For example, he stated, opportunities of this kind are being explored in connection with tank cars, such as are used in the movement of petroleum and its products.

#### Studies Nearing Completion

Other studies, completed or nearing completion, were said to cover car pooling; unification or joint use of terminal facilities; better utilization

and equipment of shops; standardization and simplification of equipment, materials and supplies; establishment of a centralized scientific research organization; better methods in the disposition of scrap and in the handling of stores, etc.

These inquiries are expected to focus attention upon some of the vital problems of railroad management and operation, bring to the forefront many new possibilities and constructive ideas and point the way to changes which will link economy with more and better service. The objective which such program should place

#### LEADING THE WAY

**I**N discussing the investigations which he is carrying on as Federal coordinator of transportation, Joseph B. Eastman took occasion to stress the importance of introducing light-weight rolling stock as a factor in railroad rehabilitation. Readers of *THE IRON AGE* have had an opportunity recently of keeping pace with developments along this line. Our issue of May 3, page 14, contained a general survey of the possibilities that have been opened up by progress in the field of light-weight freight car construction. On Sept. 20, page 25, appeared a description of a new type of freight car built of high-tensile steel which has been developed by the Baltimore & Ohio railroad. The use of unit steel castings for freight car underframes was discussed at length on July 12, page 10. Aluminum as a material for both passenger and freight car construction was covered in our issue of Aug. 2, page 16, while on page 8, issue of Aug. 9, the potentialities of stainless steel as a material for passenger trains were treated.

Mr. Eastman also mentioned the use of demountable containers which can be transferred from car to truck. A story covering this development will appear in an early issue of *THE IRON AGE*.

above all others, according to Mr. Eastman, is the promotion of a system of transportation which will swell the volume of interchange and movement by furnishing better facilities at lower cost.

Pointing out that the principal trouble with the railroads at present is the low volume of traffic, Mr. Eastman said that a revival of business would have an excellent effect on the railroads. On the other hand, railroad revival would stimulate business. The Government, he stated, has recognized this with loans, amounting to nearly \$200,000,000, which the PWA has made on favorable terms to the railroads for rails, equipment and general maintenance. These have been of decided benefit to the capital goods industries, as well as to the railroads, and Mr. Eastman hopes and expects that the policy can be continued.

#### Rates Not Too Low

Mr. Eastman disagreed with the view that railroad troubles are traceable to a "misguided Interstate Commerce Commission which has kept rates on too low a level." Although he dwelt on this subject briefly, his remarks were significant in view of the fact that the commission will begin hearings on a petition for a general rate increase on Oct. 1. Whether correctly or not, Mr. Eastman's words were interpreted to mean that he is opposed to a general rate increase. He mentioned casually that after the general rate reduction of 10 per cent in 1922, "the railroads did not at any time seek a general increase in tariffs until the preposterous request for a 15 per cent increase in 1931, when commodity prices generally and traffic were falling sharply and competition from other transportation agencies was rapidly increasing."

It was brought out that "the thing which has hurt the railroads most severely during the depression has been the greatly increased competition which they have met from other forms of transportation. Some of them are old and some new, the latter including motor trucks and buses,



private automobiles, water lines, pipe lines and airplanes."

#### Federal Regulation Needed

While Mr. Eastman has advocated Government ownership of the railroads, he has said that the Government is in no financial condition to take them over at this time.

Accordingly, he summed up the railroad problems of today as follows:

So long as transportation agencies are privately owned and operated, there is little that the Government can do to further their welfare, short of actual subsidies, except to maintain a

system of regulation which will, without paralyzing initiative, prevent exploitation, discourage destructive competition, promote order and stability, and permit an adequate return to be earned on legitimate investment, and also to extend every possible aid, consistent with public safety and the well-being of employees, to improvements in management, operation, and financial organization which will tend toward more and better service at the lowest possible cost to the public served. Given such conditions, the remainder of the problem must be left for the private managements to answer. I have tried, in my work as Federal coordinator of transportation, to be guided by these principles.

## Industry Organizes to Formulate Legislative Program for Congress

**U**NDER the sponsorship of the National Association of Manufacturers, industry is being organized to formulate a definite program reflecting the views of industrialists upon the proper relationship of Government to business, for presentation before January to Congress and the Administration. With much of the emergency legislation, including the recovery act and the agricultural adjustment act expiring next June, the question of new measures to hasten business recovery will be dominant before Congress.

The first meeting of the association's Committee on Future Relations of Government to Industry was held at the Waldorf-Astoria, New York, under the chairmanship of James W. Hook, president, Geometric Tool Co., New Haven, Conn., and former resident code adviser of the recovery administration in Washington.

#### Do Not Wish to Be Carping Critics

Expressing appreciation of the problems which have confronted the Administration seeking to restore jobs to the millions out of employment, Mr. Hook said, following the committee meeting, that "manufacturers will be mere carping critics unless they try to dovetail and coordinate their own viewpoints on the subject before the day for perpetuating or changing the emergency legislation is at hand." Continuing, Mr. Hook said:

This committee is not one for comment and criticism. Our procedure programs as adopted today provide for a series of meetings, conferences and hearings through which the National Association of Manufacturers will seek to get at first hand the real viewpoint of industry on the NRA.

We are going about it in a systematic fashion, without a preconceived plan to reflect industry's attitude, and transmit this in definite form as a constructive guide to Government. We are hopeful that this attempt to crystallize business opinion on this re-

covery subject will be joined by many trade and industrial associations as a means of performing a coordinated service for both business and Government.

Our committee is encouraged by the invitation for an expression of such a viewpoint from official sources, and my experience as a resident code adviser convinces me that this is the opportunity for business to take counsel with itself, so as to offer definite advice and cooperation in solving the nation's great problem of unemployment.

None has a greater stake in recovery than business and no group is more willing to cooperate in sound approaches to the problem of recovery.

#### Sub-Committees Appointed

Following the initial meeting, subcommittees were set to work upon the following subjects: Federal control of wages and hours, regulation of competitive practices, control of production, price control, agricultural adjustment administration, machinery of industrial self-government, cooperation with other organizations. In addition to Mr. Hook, the committee which will undertake the important study is composed of the following:

Vice-chairman: Joseph Bancroft, chairman, Joseph Bancroft & Sons, Wilmington, Del.; C. E. Adams, president, Air Reduction Co., New York; W. B. Bell, president, American Cyanamid Co., New York; Lewis H. Brown, president, Johns-Manville Corp., New York; William L. Allen, consulting engineer, American Rolling Mill Co., and former deputy administrator, NRA, New York; George H. Houston, president, Baldwin Locomotive Works, Philadelphia, and vice-president, National Association of Manufacturers; T. M. Girdler, chairman, Republic Steel Corp., Cleveland; Charles Edison, president, Edison, Inc., West Orange, N. J.; Robert L. Lund, executive vice-president, Lambert Pharmacal Co., St. Louis, and chairman, National Association of Manufacturers; Malcolm Muir, president, McGraw-Hill Publishing Co., New York, and former deputy administrator, NRA; E. M. Allen, president,

Mathieson Alkali Works, New York; C. B. Ames, president, Texas Co., New York; William D. Anderson, president, Bibb Mfg. Co., Macon, Ga.; Joseph Belden, president, Belden Mfg. Co., Chicago; C. C. Carlton, secretary, Motor Wheel Corp., Lansing, Mich.; Howard E. Coffin, chairman, Southeastern Cottons, Inc., New York; F. B. Davis, Jr., president, United States Rubber Co., New York; Henry M. Dawes, president, Pure Oil Co., Chicago; Paul C. De Wolf, vice-president, Brown & Sharpe Mfg. Co., Providence, R. I.; John Frederick, chairman, Continental Steel Corp., Kokomo, Ind.; A. C. Fuller, president, Fuller Brush Co., Hartford, Conn.; John Hancock, Lehman Brothers, New York; George S. Hawley, president, Bridgeport Gas Light Co., Bridgeport, Conn.; H. R. Hawthorne, vice-president, Pocahontas Fuel Co., Pocahontas, Va.; Robert B. Henderson, president, Pacific Portland Cement Co., San Francisco; D. F. Lane, W. T. Lane & Brothers, Poughkeepsie, N. Y.; Fred J. Lingham, president, Federal Mill, Inc., Lockport, N. Y.; E. J. McMillan, president, Standard Knitting Mills, Knoxville, Tenn.; C. Edwin Michael, president, Virginia Bridge & Iron Co., Roanoke, Va.; William T. Nardin, vice-president, Pet Milk Co., St. Louis; Lionel J. Noah, president, American Woolen Co., New York; Thomas M. Ramseur, vice-president, J. Schoeneman, Inc., Baltimore; J. E. Romm, president, Farmers Mfg. Co., Norfolk, Va.; Col. M. C. Rorty, Lusby, Md.; Dr. John W. Schlegel, general superintendent, National Sugar Refinery Co., Edgewater, N. J.; C. C. Sheppard, president, Louisiana Central Lumber Co., Clarks, La.; Harold C. Smith, president, Illinois Tool Works, Chicago; H. M. Tallafiero, president, American Seating Co., Grand Rapids, Mich.; George P. Wakefield, president, Kaynee Co., New York; Russell E. Watson, Johnson & Johnson, New Brunswick, N. J.; F. H. Willard, president, Graton & Knight Co., Worcester, Mass.; and Lucien Wulsin, president, Baldwin Co., Cincinnati.

## Establish Arc Welding Course at Milwaukee

**T**HROUGH the cooperation of the Harnischfeger Corp., Milwaukee, the Linde Air Products Co., New York, and the J. D. Adams Mfg. Co., Indianapolis, the School of Engineering of Milwaukee has instituted a series of courses in arc welding. Complete laboratory facilities have been installed for all types of arc welding by courtesy of the three concerns. Courses range from practical arc welding to a curriculum designed for shop superintendents in welding practice as applied to industry.

On the lecture and shop staff are: Klaus Hansen, consulting engineer, Harnischfeger Corp., and inventor of the P & H-Hansen arc welder; W. V. Emery, welding superintendent, Harnischfeger Corp.; Oscar W. Werwath, president of the School of Engineering; Ewald L. Wiedner, John Hopkins and David Clark, instructors of electricity.

# British Iron Market Less Active With Steel Demand Maintained

LONDON, ENGLAND, Sept. 24 (By Cable).—Pig iron is more quiet as consumers are heavily bought for months ahead. Stocks are decreasing with steady day-to-day business, and producers are confident of disposing of output. Export business is hampered by exchange restrictions abroad. Sales of East Coast hematite are temporarily affected by price advances, but deliveries are heavy.

Makers of semi-finished steel are well booked. Home demand for light structural steel is brisk and sheets are more active. Another cargo of steel has been shipped to Russia and large shipments of rails are going to China.

The monthly meeting of the British Iron and Steel Federation reported increased orders and general home consumption of steel at a rate of 8,000,000 tons annually, equaling the record year, 1929.

Exports in the first half of 1934 were 25 per cent higher than in the first half of 1933.

Home inquiry for tin plate is fair, but actual business is quiet. Fair demand is reported from Canada, South America and the Continent. All export prices are now quoted

c.i.f., based generally on 18s. 2d., IC f.o.b.

The recent improvement in the Continental iron and steel market continues, with bars, joists and plates particularly active, but thin sheets slow. Orders have been received from Manchuria, South Africa and South America. German mills report improvement in home and export demand, but the French market is extremely dull with no signs of autumn revival.

## Slight Employment Increase in August

INCREASES of one per cent in factory employment and three per cent in factory pay rolls were shown in August as compared with July, according to the Bureau of Labor Statistics. Employment and pay rolls in manufacturing industries normally increase in August reflecting seasonal activity in certain industries and a recovery from July shutdowns. During the preceding 15-year period, 1919-1933, inclusive, for which data are available in the bureau, increases in employment from July to August have been shown in each year except 1930 and pay rolls have increased in every instance with the exception of August, 1930 and 1931.

The Bureau of Labor Statistics' general index of factory employment for August, 1934, is 79.4 (preliminary) and the pay-roll index is 62.2 (preliminary). The August, 1934, index of factory employment is 3.9 per cent higher than the August, 1933, index (76.4), and the pay-roll index is 9.5 per cent above the level of that for the same month last year (56.8). The base now used in computing these indexes is the average for the 3-year period, 1923-1925, taken as 100.

## Construction Contracts Higher in August

THE volume of construction contracts placed during August was slightly higher than that reported for July and 13 per cent greater than the total shown for August, 1933, according to F. W. Dodge Corp., New York. Out of the August, 1934, volume of \$120,244,500 a total of \$51,046,800 was reported for non-residential building types; \$41,905,900 for public works; \$18,641,000 for residential buildings; and \$8,650,800 for public utilities.

The August totals for non-residential building and public works classifications were larger than in

August, 1933, while for residential building and public utilities the respective totals were smaller than a year ago. For both residential and non-residential building the August totals were smaller than those reported for July.

## OBITUARY

EDWARD V. ANDERSON, vice-president, Golden Anderson Valve Specialty Co., Pittsburgh, was killed in an automobile accident on Sept. 15. He was also a director of the Monessen Foundry & Machine Co., Monessen, Pa.

HOMER P. EDISON, district manager, Vanadium Alloy Steel Co., Pittsburgh, died in a hospital in that city on Sept. 18. Mr. Edison was born at Port Huron, Mich., and came to Pittsburgh in 1914, where he had been identified with the steel industry since that time.

WILLIAM C. BOLGIANO, chief engineer of design for the Industrial Brownhoist Corp., Bay City, Mich., died Sept. 19, after a brief illness. He was connected with the Brown Hoisting Machinery Co., Cleveland, for about 20 years and went with the Industrial Brownhoist Corp., when the two companies were merged seven years ago. He designed much of the coal and iron ore handling machinery now in use on the Great Lakes.

FRED KROFF, superintendent of the Bradford Machine Tool Co., Cincinnati, died on Sept. 16 after an illness of several months. He was 62 years old. He was born in Switzerland, and went to Cincinnati with his parents when he was 11 years old. He had been a resident of that city for more than 50 years.

THOMAS O'NEIL, for 12 years eastern representative, Milcor Steel Co., Milwaukee, metal building products, died Sept. 15 at his home in Flushing, N. Y., aged 61 years. He settled in Milwaukee as a youth and before joining the Milcor organization had been superintendent of the Filer & Stowell Co., and connected with the A. O. Smith Corp.

HARRY HENRY, sales representative at Cleveland for the Ex-Cell-O Aircraft & Tool Corp., Detroit, died of heart trouble on Sept. 19.

G. WALTER FISKE, formerly president of the Louisville Drying Machine Co., Louisville, Ky., died Sept. 17, at his home in St. Matthews, Ky., aged 68 years. He was one of the founders of the company, which in its earlier days was known as Geiger, Fiske & Koop. Mr. Fiske had sold his interest in the business and retired.

### British Prices, f.o.b. United Kingdom Ports

Per Gross Ton		
Ferromanganese, export .....	£9	
Billets, open-hrth. .....	£5 10s.	to £5 15s.
Tin plate, per base box .....	18s.	2d.
Steel bars, open-hearth .....	£7 17½s.	
Beams, open-hrth. .....	£7 7½s.	
Channels, open-hearth .....	£7 12½s.	
Angles, open-hearth .....	£7 7½s.	
Black sheets, No. 24 gage .....	£9 5s.	
Galvanized sheets, No. 24 gage .....	£11 5s.	

### Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £		
Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.		
Billets, Thomas... ..	£2 7s.	
Wire rods, No. 5 B.W.G. ....	£4 10s.	
Steel bars, merchant .....	£3 5s.	
Sheet bars .....	£2 8s.	
Plates, ¼ in. and up .....	£4	
Plates, 3/16 in. and 5 mm. ....	£4 2s.	6d.
Sheets, ¼ in. ....	£4 7s.	6d.
Beams, Thomas... ..	£3 2s.	6d.
Angles (Basic)... ..	£3 2s.	6d.
Hoops and strip base .....	£4 2s.	6d.
Wire, plain, No. 8 .....	£5 7s.	6d.
Wire nails .....	£5 15s.	
Wire, barbed, 4-pt. No. 10 B.W.G. ....	£8 15s.	



# Durable Goods Committee to Be Made Permanent — Reemployment Still Goal

**C**REATION of the Durable Goods Committee, set up last spring at the request of Gen. Hugh S. Johnson, as a permanent organization to crystallize and present the views of this industrial group upon national problems, has been announced by George H. Houston, president, Baldwin Locomotive Works, Philadelphia, who has been reelected chairman. The organization meeting took place at Hot Springs, Va., with more than 100 representatives of the durable goods industries present.

In announcing the organization providing for representation from every branch of industry, Mr. Houston pointed out that no platform had been adopted at the Hot Spring meeting. "When the committee," he said, "has had an opportunity to collect the facts, discuss them and arrive at a conclusion with respect to any of the problems affecting the durable goods industries, a report with respect to such conclusions will be issued."

## Membership All-Inclusive

The members of the new Durable Goods Industries Committee, who were unanimously elected at the Hot Springs meeting, are:

George H. Houston, Baldwin Locomotive Works, Philadelphia, chairman; James W. Hook, Geometric Tool Co., New Haven, Conn., vice-chairman; C. R. Messinger, Oliver Farm Equipment, Chicago; S. F. Voorhees, Voorhees, Gmelin & Walker (architects), New York; Robert W. Irwin, Robert W. Irwin Co., Grand Rapids, Mich.; George P. Torrence, Link Belt Co., Chicago; F. R. Hoadley, Farrel-Birmingham Co., Ansonia, Conn.; Lewis H. Brown, Johns-Manville Corp., New York; C. C. Sheppard, Louisiana Central Lumber Co., Clarks, La.; H. Gerrish Smith, National Council of American Shipbuilders, New York; Harry S. Kimball, Fabricated Metal Products Industry, Washington; Walter J. Kohler, Kohler Co., Kohler, Wis.; F. A. Lorenz, Jr., American Steel Foundries, Chicago; J. S. Trittle, Westinghouse Electric & Mfg. Co., East Pittsburgh; Charles R. Hook, American Rolling Mill Co., Middletown, Ohio; Robert R. Fauntleroy, Moline Malleable Iron Co., St. Charles, Ill., and three others whose acceptances have not yet been obtained.

## Reemployment to Be Studied

Reemployment in the durable goods industries is still the keystone of recovery. The Durable Goods Industries Committee will continue to analyze the conditions interfering with such reemployment, including governmental regulation of industry and the supply of capital to private business upon which these industries must rely for support, also proposed plans for industrial reform and social

changes of such a character as to discourage new enterprise.

The committee will continue also to report to all durable goods industries and to publicize its findings on these matters and to crystallize the viewpoint of industry with respect to recovery. Industry's welfare for years to come, Mr. Houston pointed out, will depend upon the effectiveness with which the industrial viewpoint is thus presented to the public and to those in authority.

Each industry has been requested by the committee to select immediately its member in the Durable Goods Industries Council and to notify the committee of the name, address and connection of the person thus selected. This Councillor should be a business executive, active within the industry, well acquainted with the other employers within the industry and prepared to cooperate with the committee in effecting its contact with the industry which he represents.

## Administration Labor Policy Requires Change

**"I**F industry is permitted to operate its codes under the original concept of self-government and can secure the necessary enforcing of compliance, there is still hope that this first effort of the New Deal will add materially to recovery." This opinion was expressed by Malcolm Muir, president, McGraw-Hill Publishing Co., New York, in the first of a series of radio broadcasts on business conditions under the auspices of the Merchants Association of New York.

Last year, however, Mr. Muir pointed out, the Administration ac-

cepted labor leadership as enlightened leadership and placed its faith in it. But labor leaders, in his opinion, have not justified that faith. "Ignoring all else," he said, "they have used NRA and the New Deal generally, as a union organization movement. In some industries they have permitted the radical element to dominate the newly formed or greatly enlarged employee organizations. The larger possibilities for all labor which the New Deal offered have been passed by in the rush to enlarge union membership. Dues are being collected and these new members want action for their money. They are getting it, as we well know, but it is the kind of action that destroys industrial peace and retards recovery, and its cost is shocking to the communities and their citizens who are affected by strikes and other labor disorders.

"The Administration is faced with the problem of changing its attitude toward those who are now dominating union policies. It cannot afford, at the expense of public confidence, to be held responsible for the untoward and regrettable occurrences that have marked labor relationships and jeopardized recovery during the recent months."

In conclusion Mr. Muir emphasized the fact that recovery cannot be achieved unless business succeeds in getting back to normal. "No one," he said, "wants recovery more earnestly or is striving harder to effect it than the business man. No one has worked harder during these last five years to correct the mistakes of the past and accomplish this purpose. It is obvious that fear of the extent to which reform measures of the New Deal will be pushed through, is creating the lack of confidence which is the key log in the jam that is holding back private enterprises today. This intangible force, lack of confidence, has a grip upon the throat of business beyond the power of any business man, singly or collectively, to break. The answer rests in the hands of the Administration.

**T**HAT failure may be detected before it happens; that excellence shall be made more perfect, we have the art of testing. It brings to metallurgy the knowledge of the physicist with regard to the endurance of the products of fire, forge and rolling mill. It provides weak human hands with power to overcome the strength of steel and human minds with the knowledge of how to make it stronger.







## THE WEEK IN WASHINGTON

# NRA Soon to Be Reshaped

*But What the Reshaping Will Do to the NRA Structure and Its Personnel Is Still Anyone's Guess*

**W**ASHINGTON, Sept. 25.—Sweeping reorganization of the NRA is expected to be announced soon by President Roosevelt. Pressure for this long-contemplated action has been heightened by rows within the administration and demands of industry for widespread changes. In order to bring the situation to an early conclusion, the President held final conferences on the subject at Hyde Park, prior to returning to the White House in Washington. These conferences were held with Bernard M. Baruch and with Gerard Swope, president, General Electric Co. Meanwhile, the Chamber of Commerce of the United States, basing its views on returns from a questionnaire sent to its membership, has urged that the NRA as it now exists be cast aside and set up on an entirely new basis. It asked that codes be made applicable only to interstate business, thus greatly trimming down the existing complicated structure, and sought greater opportunity for self-regulation. Mr. Swope had heretofore proposed reorganization of NRA so that there would be greater control by industry and less by the Government. Organized labor has urged retention of Section 7-A in its present form, or, if changed, to make it clearer as to the right of labor as to collective bargaining. Reports persist that Administrator Hugh S. Johnson will resign, or has resigned, or that, if acceptable to him, he will have a relatively minor position in the new organization. There is no verification of the report that Mr. Baruch has been offered and accepted a position with other prominent men in the reorganized body.

By **L. W. MOFFETT**  
Resident Washington Editor  
**THE IRON AGE**

The most definite statement coming recently from Hyde Park was that NRA would be modeled after the Federal government organization, with legislative, executive and judicial functions.

### Legislative Branch

According to reports, the so-called legislative branch would be made up of prominent men in industry to shape policies. It is likely also that labor would demand representation on such a board, as well as on a board to administer policies and enforce them. Such a reorganization is in line with proposals of Donald R. Richberg, former general counsel of NRA, now a closer adviser to the President. General Johnson's idea was the establishing of a board along the lines of a board of directors of an industrial organization, though the General stated he had left no place on the board for himself. His differences with Mr. Richberg are said to have caused him to submit his resignation to the President. The resignation was withdrawn at the request of the President.

The administrator, however, is said to have irritated the administration greatly in his recent radio broadcast in New York when he attacked the United Textile Workers proposed organization of labor along vertical lines, and dragged in the name of Associate Justice Louis D. Brandeis of

the United States Supreme Court as an adviser on NRA and its policies. The expressions are said to have capped the climax of differences, and because of his attack on the Cotton Textile union, organized labor heatedly demanded General Johnson's complete removal from NRA. The administration likewise is said to have been especially aggravated over the attack because it came at a time when it was making strenuous moves to settle the textile strike. The settlement finally made upon recommendations of the Winant committee has been acclaimed by organized labor as one of the greatest victories it ever achieved. There appears to be good reason for organized labor's enthusiasm, though in many respects various industrialists have approved the report as being fair to both employers and employees.

NRA really has been almost rudderless since General Johnson left Washington early in July. His return from his "vacation" is looked upon simply as a temporary circumstance, certainly so far as his being head of the organization is concerned.

### Richberg and Baruch

Whether or not Mr. Richberg rather than Mr. Baruch may be made chairman of the policy-making board or otherwise assigned to a prominent position in the reorganized NRA, it seems clear he will be an important factor in its destinies. His views and those of Gerard Swope have a great deal in common, except that Mr. Richberg would retain a great deal more Federal jurisdiction over industry than would exist under the plan of Mr. Swope. An organized labor man, Mr. Richberg obviously is alto-

gether sympathetic toward unionized industry, yet differing on some points with prominent members of the American Federation of Labor. Mr. Richberg, it will be recalled, joined General Johnson in a memorandum last year, insisting upon the right of minority representation for purposes of collective bargaining. The federation favors majority representation and has been given strong support in its contention by the National Labor Relations Board. Mr. Richberg, also like General Johnson, has gone on record in favor of the vertical union. The federation's general policy appears to favor craft unions, though it has its own vertical unions, including the Cotton Textile Union, United Mine Workers and many others, including the Amalgamated Association of Iron, Steel and Tin Workers, now converted from its old status of a craft union, then known as the "aristocrat" of unionism, and much more cohesive than it is under its present status. It will be recalled that it was over the vertical-craft union issue that the first major break in the NRA took place and caused the resignation of Dudley S. Cates, assistant recovery administrator. He insisted upon the vertical union as the medium for negotiations between employers and employees. General Johnson at that time agreed that "with an industry organized vertically, the local labor organization is vertical also." But, apparently inconsistent with his attitude in his recent New York broadcast, General Johnson pointed out that the recovery act guarantees to employees the right of collective bargaining through representatives of their own choosing, which, he said, he took to mean "no theoretical administrative choosing."

Whatever reorganization is effected, it is not believed that NRA will be as radically reshaped as urged by the United States Chamber of Commerce. It might, however, be greatly simplified as that body urges. Mr. Richberg is said to share the growing view that NRA's efforts to "regiment" the entire business structure of the United States, from the smallest to the largest, and to enforce the law is out of the question. Those taking this view have said the job is too complicated and unwieldy; that it is in conflict with State laws, and calls for the setting up of a tremendous governmental bureaucracy, chiefly effective in creating turmoil and confusion and in retarding recovery.

The chamber, in addition to urging that codes be applicable to interstate business only, would give much wider authority to business for self-government, let it write its own codes, and get government approval. Those not getting such approval would be subjected to the anti-trust laws in their fullest sense. Codes would be cut down to only 45 industries, taking in the major and other important ones, which engage about 80 per cent

of the nation's employees. The labor section, Section 7-A, would be revamped so that employers would deal with employee representatives chosen "without coercion either from employers or from others." The licensing provision would not be revived.

Organized labor's questionnaire directed to candidates for the Senate and the House of Representatives proposes to nail conceptions when and if they vote for permanent reorganization of NRA. Not only does the American Federation of Labor again insist upon the 30-hour, 6-day week, while its officials know it is an utter economic impossibility, but demands retention of Section 7-A as it stands, enactment of the Wagner-Connelly labor disputes bill, which, among other things, would outlaw the company union, but asks for a wide range of social legislation.

Striking back, the National Association of Manufacturers has also sent a questionnaire to the candidates, thus adding to their perplexity. It centers its campaign against Government bureaucracy, though not using that term, and freedom of industry and labor from what it calls coercion in labor movements. It strikes at government competition with private business, and, like the Chamber of Commerce, comes out for slashing of the enormous government expenditures and balancing of the budget, the latter obviously not an early prospect.

The forthcoming legislation on labor sees both labor and industry tightening their reins for a hard drive. Just at the present organized labor is altogether certain that it is leading in the race. The Winant board report, following the Houde decision giving to labor the right of majority representation, has further flushed organized labor with success and open declarations are made by officials of the Cotton Textile Workers' Union that they proposed to completely unionize the textile industry with the largest membership of any union in the country. Other unions, in other industries, are taking the cue and moving in a similar direction. Hence the effort to curtail powers of labor under existing legislation and legislation that will be demanded with much further power insisted upon.

The reorganization of NRA will undoubtedly take into consideration the labor issue, though NRA, of course, is largely stripped of its jurisdiction over labor matters, and is certain to be deprived of more jurisdiction as the result of the Winant mediation board report which proposes removal of all labor provisions from the textile code authority. This may be looked for with regard to other codes, and the creation of a textile labor relations board. The Winant board rejected the demand of the cotton textile union that it be chosen as the exclusive agency for purposes of collective bargaining. In-

stead, the board urged that negotiations for settlement of labor disputes be made on a plant-to-plant basis, and upheld the majority representation plan. Cotton textile workers' union officials, however, said the board gave union labor the widest possible recognition. In addition to recommending ending of the so-called stretch-out system, condemned by many industrialists themselves, the board proposed inquiries as to wages and hours with the right of the Federal Trade Commission to go over books of mills to see whether they can shorten hours and increase wages.

## Large PWA Allotments Made Recently

WASHINGTON, Sept. 25.—Among PWA allotments recently made are the following:

Houston, Tex., \$1,219,000, loan and grant, construction of fireproof City Hall.

Handley, Tex., \$150,000, loan and grant, to Tarrant County Water Control and Improvement District No. 2, for use in acquisition of present privately owned water system and construction of completely new system.

Galen, Mont., \$215,000, loan and grant, to State Board of Examiners, acting for Montana State Tuberculosis Sanitarium, for construction of four-story fireproof hospital, garage, alteration to existing carpenter shop, additions to other building, and reinforced pipe tunnel.

Greensburg, N. Y., \$226,000, loan and grant, construction of approximately 12,206-ft. of trunk sewers to connect existing sewers in district to Bronx Valley trunk sewer.

New York, \$468,700, removal of existing structure and construction of bascule bridge with pier and abutment across Wallabout Canal and Washington Avenue, including widening of approaches, dredging of canal and appurtenant work.

New York, \$1,198,300, construction of five fireproof health center buildings, two located in Manhattan, one in the Bronx, one in Brooklyn, and one in Queens.

Washington, \$3,610,000, to complete Federal Archives Building.

## Steel Labor Board to Hear Carnegie Cases

WASHINGTON, Sept. 25.—The National Steel Labor Relations Board will hold hearings in Pittsburgh Oct. 1 and 2 on petitions of lodges of the Amalgamated Association of Iron, Steel and Tin Workers for elections to determine the right of representation for collective bargaining. On the first day the hearing will be devoted to the petition of workers at the McDonald, Ohio, plant of the Carnegie Steel Co. The second day will relate to a petition of workers at the Duquesne, Pa., plant of the Carnegie company. The hearings will be held in the Federal building.

The board is expected to report soon to Secretary of Labor Perkins on the work it has done since it was set up.



# Richberg Blames Industry For Code Intricacies—Cites Steel As Example

WASHINGTON, Sept. 25.—Referring specifically to the steel code, Donald R. Richberg, former general counsel of NRA, has laid at the door of business responsibility for the intricacies of codes. An Administration member of the steel code authority, Mr. Richberg is also executive director of the National Emergency Council. Addressing the Advertising Club of Baltimore last week he made a tart reply to criticism of Government bureaucracy and sought to pass the blame back to business itself for complicated regulations governing codes.

In his best satiric vein, Mr. Richberg said:

For a year we have been watching the leaders of American trade and industry pour into Washington accompanied by high-priced lawyers, economists and statisticians. We have seen them write their own codes of fair competition and set up their enforcing authorities for self-discipline, restrained all too little for their own good by Government supervision. And now we hear rising a strange discord of criticism. On the one hand the cry that big business is controlling the codes; and on the other the cry that the Government is strangling business with red tape and bureaucratic regulations.

If this clamor were not so vicious, it would be ludicrous. Probably the longest, most detailed regulatory code that has been written is the steel code with literally hundreds of pages of basic code and supplementary regulations. It was written almost entirely by the industry. It is administered with a minimum of public control. Its administration requires the expenditure of \$500,000 annually and a force of employees who, if established by the Government, would be called a bureaucracy.

Personally I do not believe that a host of such codes and such bureaucracies can be or should be made permanent. I believe profoundly in the wisdom of the process of codification; but I believe also that it must be simplified. But, if anyone desires to criticize the codes that have been written, and their administration, as being enmeshed in red tape and establishing bureaucracies, why, in the name of honesty, does he not criticize the business men who wrote the codes and set up bureaucracies for their administration? The National Government offered to industry an opportunity of self-government and if the experiment needs revision, the principal difficulty does not lie in persuading the Government to do the job, but in persuading the business men of the country to simplify these complicated mechanisms which they themselves devised.

## Will Codes Be Simplified?

Mr. Richberg's remarks were taken to mean that there will be an earnest effort made by the Roosevelt Admin-

istration to reduce codes to much greater simplicity. Being an Administration member of the steel code and pointing to it as an especially complicated document, there was speculation as to whether efforts might be made, before new NRA legislation, to reduce it to simpler terms.

He gave to public officials, rather than to business, credit for efforts to get rid of unfair competition, red tape and bureaucracy. Stating that there is much talk of reorganizing NRA, Mr. Richberg said there ought to be an equal amount of talk about reorganizing business to get rid of the evils mentioned. Public officials, he declared, have taken the lead in this reform.

Replying to complaints of an NRA dictatorship, Mr. Richberg said that in the Administration there has been an agreement for months upon the necessity of ending anything that even looked like one-man control. There is today no such control, he said, except to the extent that Congress has vested a single ultimate responsibility in the President.

On the subject of the NRA's future, Mr. Richberg added:

There has also been agreement upon the necessity of establishing a deliberative representative board to determine policies and to direct the ad-

## Steel Companies Protest Freight Rate Increase

WASHINGTON, Sept. 25. — The Otis Steel Co., the Republic Steel Corp., and the Youngstown Sheet & Tube Co. have asked the Interstate Commerce Commission to let them be heard in protest against the proposed general freight rate proposal, hearings on which begin Oct. 1. Opposition to the increase also has been filed by the East Penn Foundry Co., Macungie, Pa.

H. M. Lorenz, traffic manager for the Otis Steel Company, said he desired to give testimony protesting the rate increase proposal, especially on coal and iron ore. H. D. Rhodehouse of the Republic company said he expects to present testimony in opposition to all or part of the proposal. J. C. Argetsinger and A. C. Graham of the Youngstown company asked to be heard in opposition to all or a portion of the proposed increases.

H. M. Singmaster of the East Penn Foundry Co., expressed strong opposition to proposed rate increases on cast iron soil pipe and fittings. He pointed out that the industry is handicapped severely, due to lack of

ministration of NRA. There has been agreement upon eliminating any form of dictatorial control over prices or production. It is contrary to the public interest to establish any such private or public controls except those necessary to prevent unfair competition or the waste of natural resources. And when any regulations are needed, they must not be dictated by any one man or by any group of men, but must be determined and enforced by a representative responsive to the public interest and made responsible to public obligations.

Where does there arise any opposition to such a policy? Only from those who by a present or anticipated use of dictatorial power see a selfish advantage in creating or maintaining a power which is contrary to our economic principles of fair competition and to our democratic principles of self-government. That sort of opposition cannot be permitted to block the progress of NRA.

Regardless of temporary difficulties and misunderstanding, Mr. Richberg pointed out that the NRA is going forward and will merit and obtain increasing public support as its policies and purposes are more clearly defined and consistently maintained. He said that there is no acceptable alternative. It was declared the country will not go back to 1926 "and begin to rehearse again for the 'Follies of 1929.' We will not follow other nations into state control of industry and accept the loss of self-government and the death of individual freedom. Nor will the American people tolerate a private monopolistic control of trade and industry under any name or in any form."

normal business, curtailed production, and the high cost of materials. However, he said, if the soil pipe industry is to be handicapped by any increase in freight rates, "we feel that the increase should be on a straight percentage on some rates and maximum increases per ton on others."

## C. & N. W. Asks for PWA Repair Loan

WASHINGTON, Sept. 25.—Application for authority to borrow \$5,650,557 from the PWA to finance a maintenance and equipment program has been made to the Interstate Commerce Commission by the Chicago & North Western Railroad. The carrier stated that the PWA had indicated it would approve the loan upon certain conditions which it has met. The funds are to be used as follows: Making heavy repairs to 160 locomotives, \$1,192,500; overhauling and modernizing 38 steel coaches, \$379,067; installation of air conditioning equipment in six steel dining cars, 19 steel parlor cars and 20 steel lounge cars, \$358,990; general maintenance work on roadway, structures and equipment, \$3,720,000.

# Manganese Casting Industry Placed Under New Code — Other Code News

**W**ASHINGTON, Sept. 25.—An order approving the code of fair competition for the steel casting industry as the code for the manganese steel casting industry has been issued by the NRA. The order defines "manganese steel castings" to mean that group of steel castings known in the trade under that name and having a manganese content of not less than 10 per cent.

The order further provides that the continued participation of the Manganese Steel Founders' Society in the code authority after 30 days from Sept. 24, shall be contingent upon its amending its constitution and by-laws to the satisfaction of the administrator. The order was effective Sept. 24.

## STEEL PLATE FABRICATING

The code authority for the steel plate fabricating industry has asked NRA approval of a uniform method of cost accounting to be used in estimating the costs below which sales are forbidden. Deputy Administrator Walter G. Hooke has announced that any comments on the proposed system must reach him before Oct. 3. The headings of the proposed system are: Material and freight, drafting, labor, works expense and general overhead, erection labor, erection expenses and erection general expenses. Each of these headings is precisely defined in the proposed system.

## ELECTRICAL MANUFACTURING

The NRA has denied a request by the code authority of the electrical manufacturing industry for the exemption of certain industry members from provisions of the code of fair competition of the gear manufacturing industry. It was contended by the code authority that the manufacturers of electric gear motors were being made subject to the codes for both industries.

## CAST IRON SOIL PIPE

The Clay-Bailey Mfg. Co. and the Morgan Foundry Co., both of Kansas City, and the National Foundry Co. of New York have applied to the NRA for exemption from the 27-hr. weekly limitation on labor and machine production under the cast iron soil pipe code.

## PIPE NIPPLE MANUFACTURING

After setting forth at a hearing the differences in their activities, representatives of the pipe nipple and the valve and fitting manufacturing industries agreed to an informal conference on the first industry's request for termination of the exemption in Administrative Order X-36.

Deputy Administrator Pilkington, who presided at the hearing, assented to the arrangement and both sides promised to submit the result of their conversations.

## CAST IRON PRESSURE PIPE

Thirteen members of the cast iron pressure pipe industry have been exempted from the wage and hour provisions of the code for the gray iron foundry industry. The request for exemption came from the code authority for the cast iron pressure pipe industry. It was shown that the complaining manufacturers do occasionally make castings covered by the gray iron foundry code, but that these cast-

ings aggregate only 65/100 of 1 per cent of their total production.

## SCRAP IRON AND WASTE MATERIALS

Public hearing on a proposed amendment to the code for the scrap iron, non-ferrous scrap metals and waste materials trade will be held Oct. 2 at the Willard Hotel. The proposed amendment would place Missouri in the code's list of "Southern" states.

The code authority for the scrap iron, non-ferrous scrap metals and waste materials trade has submitted a proposed modification of the industry's approved code. The following amendment would be inserted in the code to replace the present Section 3 of Article IV: "The weekly rate of pay for all classes of employees receiving more than the minimum wages prescribed in this article shall not be reduced from the rates existing upon July 15, 1933, notwithstanding any reduction in the number of working hours of such employees, and the pay for such employment shall be increased by an equitable readjustment of all pay schedules."

Any objections to the proposed amendment will be heard on Oct. 2 at the Willard Hotel.

## STEEL TUBULAR AND FIREBOX BOILER

The steel tubular and firebox industry code authority has proposed amendments to the industry's code providing for a budget and basis of assessment. The authority also seeks termination of the exemption in Administrative Order X-36, under which a firm is freed from contributing to expenses of a code other than that covering its principal line of business. The total amount of the proposed budget is \$15,750. The proposed rate of contribution is one-half of 1 per cent of total sales. It is also proposed that each member shall report each month the total number of square feet of heating surface shipped, and that his assessment bear the same ratio to the total monthly code expense as his shipped heating volume expense bears to the total heating surface shipped by the industry.

## ROAD MACHINERY BUDGET

The code authority of the road machinery manufacturing industry has submitted for NRA approval a budget totaling \$20,000, the estimated amount necessary for code administration expense from Oct. 31, 1933, to Dec. 31, 1934. The industry has suggested that industry members contribute for budget support at the rate of 2/10 per cent on 1933 gross sales. Estimated total sales for 1933 were \$10,000,000. The code authority has also petitioned the NRA for termination of the exemption granted by Administrative Order X-36, in order that industry members, irrespective of whether the road machinery code covers their major line of business, be required to contribute to the code fund for their proportionate share of administrative expense.

## NON-FERROUS FOUNDRY BUDGET

The code authority for the non-ferrous foundry industry has applied for approval of its budget for, and of the basis of contribution by members of the industry to, the expense of administering the code for the industry from Dec. 18, 1933, to June 16, 1935. The total amount of the proposed budget is \$104,626.40. The basis of contribution would be three-fourths of 1 per cent of gross sales of products of the industry as defined by the code, for the period of the budget, payable monthly on the previous month's sales.

## WOODWORKING MACHINERY

One of the provisions of the supplemental code for the woodworking machinery subdivision of the machinery and allied products industry, stayed when the code was approved, has been brought into partial force by an order of the NRA. Among the conditions of approval was that satisfactory evidence concerning the distribution of products of the subdivision be submitted to the administrator. This evidence has been submitted and is regarded as satisfactory.

In making the stayed provision effective, the NRA stipulated that the stay shall "not apply to the sale and distribution of small light types of machines, which are installed in homes for recreational or amusement purposes, and which are known in the industry as the 'homecraft' type of equipment."

## ELECTRIC TOOL

Public hearing on a proposed supplemental code for the electric tool industry—a division of the electrical manufacturing industry—will be conducted Oct. 4 in Room 2062, Department of Commerce building. Sponsored by the National Electrical Manufacturers Association, which claims to represent 84 per cent of the industry, the code would adopt the hour and wage provisions of the master code, but would set up its own sections on prices and terms, including a classification of customers and separate trade practice provisions. Products included under the code consist of electric drills, valve seat grinders, refacers, tappers, screw drivers, and various other portable or semi-portable tools having at least one electric motor as an integral part of the product; also replacement parts for these various products.

## CODE AUTHORITY IS NAMED

Recognition of the following code authority has been announced by the NRA:

*Canning and Packing Machinery Industry:* Ogden Sells, San Jose, Cal.; John C. Albright, Chicago; John Dupps, Jr., Cincinnati; R. A. Sindall, Baltimore; Frank C. Chapman, Berlin, Wis.; Lee W. Duer, Elgin, Ill.; W. E. Nicholay, Columbus, Ohio; R. T. Randall, Philadelphia, and L. J. Meages, St. Louis.

*Road Machinery Manufacturing Industry, coordinating agency:* S. F. Beatty, president, Austin-Western Road Machinery Co., Aurora, Ill.; W. R. Adams, vice-president, J. D. Adams Co., Indianapolis; C. O. Weld, vice-president, Caterpillar Tractor Co., Peoria, Ill.; J. L. Connors, vice-president, Galion Iron Works, Galion, Ohio; W. A. Roberts, general sales manager, tractor division, Allis-Chalmers Mfg. Co., Milwaukee, and Jack B. Haile, manager of the road machinery division, Garwood Industries, Detroit.

*Machinery and Allied Products Industry (pulverizing machinery and equipment subdivision):* E. W. Traylor, Allentown, Pa., Traylor Engineering & Mfg. Co.; T. Stig-Nielsen, New York, vice-president, F. L. Smith & Co.; E. H. Fromm, New York, manager, cement division, Babcock-Wilcox Co.; W. A. Gibson, Allentown, Pa., managing director, Bradley Pulverizer Co.; H. Schiffelin, Milwaukee, Wis., manager, crushing, cement and mining machinery department, Allis-Chalmers Mfg. Co.; C. M. Lauritzen, Chicago, vice-president and general manager, Raymond Bros., Impact Pulverizer Co.

*Packaging Machinery Industry and Trade (Paper Box Machinery Industry and Trade subdivision):* George Z. Zutton, Philadelphia, chairman, Stokes & Smith Co.; C. H. Lambelet, Hoboken, vice-chairman, New Jersey Machine Corp.; Charles J. Beck, Philadelphia, Charles Beck Machine Co.; Otto P. Schultz, Hyde Park, Mass., John T. Robinson Co.; Robert Minkow, New York, of the Hobbs Sales & Service Co.



# PERSONALS

THOMAS WOODS, assistant to the president, and a director of Carnegie Steel Co., will retire on Oct. 1. His retirement is in line with the United States Steel Corp'n. pension plan. After being graduated from high school and private school in the Pittsburgh district, Mr. Woods entered the employ of Carnegie Brothers & Co., Ltd., in 1881, later being transferred to Carnegie, Phipps & Co., Ltd. He was appointed assistant general agent of the Carnegie Steel Co., Ltd., in 1900, and in 1924 became special agent for the disposal of blast furnace products and coke by-products and the purchase of scrap metals. He became assistant to the president in January, 1927, and in October, 1930, he was appointed a director.



T. WOODS

CHARLES H. HERTY, JR., has been appointed a research engineer in the development and research Department of Bethlehem Steel Co. Dr. Herty was formerly director of research of the Mining and Metallurgical Advisory Board of the Carnegie Institute of Technology. Dr. Herty was graduated from the University of North Carolina in 1918. From there he went to Massachusetts Institute of Technology, where he remained until 1920. In that year he went to the Lackawanna Steel Co., with the Massachusetts Institute of Technology's School of Chemical Engineering Practice. From 1922 to 1924 he was at the institute, obtaining his doctor's degree in the latter year. He then returned to Lackawanna with the Practice School until May, 1926. During that time he studied open-hearth reactions. He became identified with the Bureau of Mines at Pittsburgh in 1926, remaining until January, 1932. He headed cooperative research for the Bureau of Mines and Carnegie Technological Institute's Metallurgical Advisory Board. He left the Bureau of Mines in January, 1932, to continue his work as director of research for the Metallurgical Advisory Board.



C. H. HERTY, Jr.

dency of the American Enameled Magnet Wire Co., Port Huron, Mich., and will supervise operations of Electric Auto-Lite, Ltd., Sarnia, Ont. He has been president of the Wire company for 10 years, but served in that capacity only incidental to active duties as vice-president of the Electric Auto-Lite Co.

S. WELLS UTLEY, president, Detroit Steel Casting Co., Detroit, has been named vice-commander for the State of Michigan of the Crusaders, a national organization which has as its aim opposition to growing regimentation in American economic and political life.

M. L. ECKMAN, research engineer, Federal Machine & Welder Co., Warren, Ohio, has returned from a six months' trip abroad, during which he visited leading automobile plants in England, France, Germany, Italy and Spain.

O. J. HUNTLEY has been appointed sales representative of the Ex-Cell-O Aircraft & Tool Corp'n., Detroit, in

the Dayton, Ohio, territory. He has been a precision boring demonstrator with the Ex-Cell-O company for several years.

CHARLES MCKNIGHT, International Nickel Co., Inc., is now chairman of Committee A-9, on ferroalloys, of the American Society for Testing Materials. W. R. SHIMER, metallurgical engineer, Bethlehem Steel Co., is vice-chairman, and J. J. CROWE, engineer in charge, apparatus research and development department, Air Reduction Sales Co., is secretary.

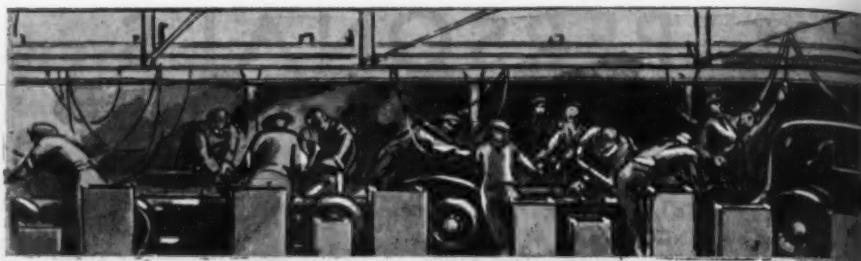
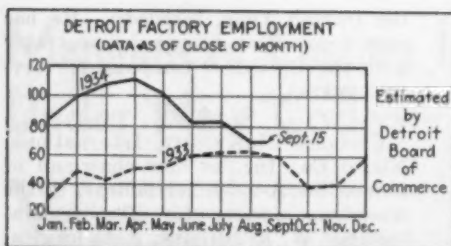
E. J. GOODBOLD has been named production supervisor of the Reo Motor Car Co., Lansing, Mich. He was connected with the Chrysler Corp'n. for over 10 years in various production and planning capacities. Later he was associated with American Cirrus Engines, Inc., Marysville, Mich.

F. H. MISSIG, purchasing agent at Detroit for the Aluminum Co. of America, has been named president of the Purchasing Agents' Association of Detroit. R. J. MAUER, Detroit Lubricator Co., has been elected first vice-president, and JOSEPH MCROBBIE, American Blower Corp'n., second vice-president. HENRY GEORGE, General Motors Corp'n., has been made treasurer.

## Sheet Steel Sales Lower in August

SALES, production and shipments of sheet steel declined in August, according to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh. In this survey, which is based on figures covering a monthly capacity of 325,000 tons, or approximately 59 per cent of the country's total capacity of 550,000 net tons, makers reported sales of 66,064 tons in August, compared with 72,517 tons in July; production of 77,197 tons against 85,286 tons, and shipments of 77,706 tons, contrasted with 85,442 tons. Unfilled tonnage on Sept. 1 totaled 64,270 tons, or 19.8 per cent of capacity, compared with 69,472 tons, or 21.4 per cent of capacity on Aug. 1. The August report with comparisons of the two preceding months, in net tons, follows:

	August	July	June
Sales .....	66,064	72,517	114,855
Production .....	77,197	85,286	199,438
Shipments .....	77,706	85,442	301,832
Unfilled orders.....	64,270	69,472	74,392
Unshipped orders....	37,314	39,038	50,284
Unsold stocks.....	71,968	71,362	56,666
Capacity per month...	550,000	550,000	550,000
Percentage reporting..	59.0	59.0	59.0
Percentages, Based on Capacity			
Sales .....	20.3	22.3	35.4
Production .....	23.8	26.2	61.4
Shipments .....	23.9	26.3	92.9
Unfilled orders.....	19.8	21.4	22.9
Unshipped orders....	11.5	12.0	15.5
Unsold stocks.....	22.1	22.0	17.4



# THIS WEEK ON THE

## Car Manufacturers Making Fall Drive; Fleet and Truck Sales Brisk

DETROIT, Sept. 25.

**T**HE automobile industry is nearing the end of its sales season for current models in a relatively strong position. Field stocks are not excessive, and in some cases are sufficiently low that dealers may be short of cars for several weeks prior to receipt of new lines.

Manufacturers, alert to every opportunity to maintain or strengthen their competitive positions, are spending more money than they normally do at this time of the year for sales promotion work and advertising. They feel that despite the uncertainties facing the country, people are more willing to spend money than they were. They are aware of the fact that agricultural income this year is larger than in 1933, even in the area hardest hit by drought. In four Northwestern States, for example, farmers are estimated to have a total income of over \$456,000,000, whereas in 1933 they received \$331,000,000 for their products. In view of this favorable situation, the industry is seeking to garner as much of the money as possible in the form of new car sales.

### Truck Production Heavy

Car makers have felt the stimulus of good business in the fleet and truck markets. Truck production has been aided by sizable orders placed recently by the Federal Government. Fleet sales have helped sustain output of standard models of low-priced cars. The result of the active retail demand in these branches of the industry is that Chevrolet has tentatively scheduled 40,000 units in October and 35,000 in November, consisting almost entirely of 1934 Standard passenger cars, commercial cars and trucks. Last year Chevrolet completed

its production run in September and in 1932 made the final 10,000 units in early October. This is the first time in several years that assemblies of current models continued in considerable volume through November. Work on the 1935 Chevrolet line will not start until about Dec. 1.

### Plans for 1935 Cars

Despite the interest which still clings to current models, the industry is primarily bent on preparations for 1935 cars. Programs line up about as follows: it will be a race between Pontiac and some of the Chrysler-made cars for the initial 1935 offering among the Big Three. Ford will be out later than anticipated, with slight likelihood that public announcement will be made before late December. Certain General Motors divisions are heading toward the same trouble which they have experienced almost every year for some time—shortage of bodies. Delays on the part of Fisher Body already are holding back Pontiac.

Decision of Buick to adhere to its present cars without change is arousing speculation as to whether General Motors may be sending up a trial balloon to find out what happens to sales when car design is not altered prior to the heavy selling season. The present large Buicks were introduced at the start of 1934 and model 40 early in May.

Although there has been considerable talk about radical lines for 1935 cars, manufacturers in the low-price market are more likely to go half way in streamlining than all the way. With tremendous volume of business at stake, they cannot afford to experiment too daringly and risk losing their standing. The conventional

practice of adopting radical new designs by degrees will be observed.

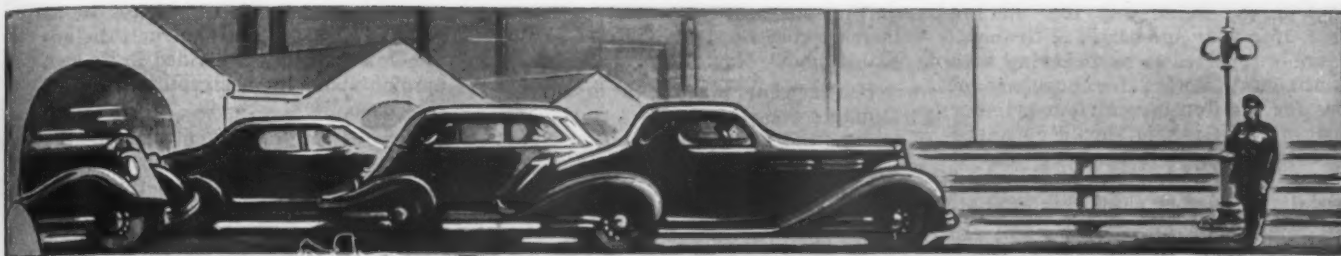
### Tool and Die Expenditures Modest

Tool and die changes, aside from those of Ford, General Motors and Chrysler, are not large by comparison with last year. Even in the case of the latter two, expenditures will not be so great as they were in 1933. Buick already has said that it will go along with present models. Whatever changes are made in the La Salle will be of a minor nature, since La Salle is regarded as the master achievement in smart appearance among General Motors cars. New dies will not be necessary for the Air-flow Chryslers and De Sotos.

In assigning reasons for relatively few changes for 1935, one should not overlook the desire on the part of most companies, particularly the smaller independent makers, to conserve their cash resources. At least two or three companies are in a position where they haven't enough cash on hand to put through extensive retooling programs. One might add that such programs seem unnecessary to many observers, in view of the mechanical perfection of most cars today and the modern body lines which they possess.

Lack of confidence in the Roosevelt administration's future plans for recovery is acting as a brake on expenditures for retooling. The constant turmoil instigated by unionized labor is bound to have a disconcerting effect. The automobile code was renewed on Sept. 4 for only 60 days, and upon its expiration the possibility exists that many of its provisions, including those relating to labor, may be reopened for debate. The labor situation at the moment is far from tranquil. The Automobile Labor





# E ASSEMBLY LINE

Board has ruled that the recent company union elections at the Hudson Motor Car Co. are invalid, but may stand until authorized elections are held. This decision has been scored by the Associated Automobile Workers of America.

## Union Labor Again Militant

It appears certain that the troublesome matter of employee elections, how they shall be conducted and how the results should be interpreted will have to be met in the near future by the Labor Board. Statements by important officials of the American Federation of Labor indicate that with the approach of an upturn in activities and in employment in the automobile industry, the Federation will again become militant, following several months of quietude.

There is slight doubt that automobile manufacturers believe that practically all they have obtained from their code is grief. The code is one of the simplest and shortest among all NRA codes, containing no provision for price control. Its most distinctive feature is the so-called merit clause, which no other code contains. Chief results have been increased outlay for labor and strife engendered by the collective bargaining clause.

With the entire automobile industry indifferent regarding the renewal of its code, perhaps it is merely a coincidence that Fisher Body Corp. precipitated the first flagrant violation of the price provisions of the hardwood lumber industry. Fisher is the largest buyer of certain types of hardwood. Producers found that if they expected to retain Fisher's business they must grant prices less than those allowed by their code. Facing this decision, they were not long in choosing to retain their biggest customer and run the risk of what NRA might do.

## Agitation for Detroit Base

What Fisher Body has done in the lumber trade, General Motors and other motor car manufacturers would like to do in the steel industry. They would like to see all price provisions abandoned. They want lower steel prices. Companies with operations

By BURNHAM FINNEY  
Detroit Editor, THE IRON AGE

centering at Detroit are actively championing the establishment of Detroit as a basing point for steel prices. They resent paying local mills a fictitious freight rate from Pittsburgh to Detroit for steel made in Detroit. One might ask why they sell their cars "f.o.b. Detroit" when some of them assemble their products at plants variously located around the United States. The car buyer in St. Louis who purchases a car assembled in Chevrolet's St. Louis assembly plant pays the all-rail freight rate from Flint, Mich., to St. Louis. The reason assigned for this policy probably is that most cars are made in or near Detroit and that Chevrolet's St. Louis assembly plant supplies only a small percentage of the cars bought in the St. Louis district. The steel industry might give a similar reason for opposing a Detroit base. Detroit district mills furnish only a small percentage of the steel bought in the Detroit area.

Outstate automotive parts companies are said to be strongly critical of the plan for Detroit base prices. In most cases their chief competition is from Detroit firms. They fabricate parts which often are shipped to automotive plants in Detroit. At present they pay \$1 a ton more for steel than their Detroit rivals. With Detroit a basing point, they would pay \$2 to \$3 a ton more.

Threatened weakness in cold-rolled strip prices, particularly in the narrow gages, is due to a situation which has been developing for some time in the Detroit district. Because of the extras charged by strip mills, consumers are finding it economical to purchase sheets and slit them into the desired widths. Several of the largest strip users are considering installation of slitting equipment at a cost ranging from \$15,000 to \$30,000. They claim that they can make savings of \$10 a ton or more. For a year or two jobbers have been buying sheets, slitting them and selling them substantially under cold-rolled strip

prices. In order to prevent consumption of the plans of large users, which would be a major disaster for cold-rolled strip mills, the cold strip industry is in the initial stages of a program which calls for a complete readjustment of the present structure for pricing its products. If this program is carried out, it should result in placing the industry on a sounder competitive basis than in several years and may enable producers to regain part of the tonnage which they have looked upon as lost to the sheet people. Pending settlement of these problems, cold-rolled strip will remain at 2.70c., Cleveland. Lower prices filed by three Detroit mills have been withdrawn.

## Detroit Notes

Ford is reliably reported to have almost 200,000 tons of steel stored at the Rouge plant. Instead of duplexing its steel, it is now using its 400-ton open-hearth furnace, the largest ever built, to make steel direct. This, of course, considerably increases its raw steel capacity. . . . Ford no longer is disassembling old cars at Rouge. Competitors always maintained that this break-up process was not economical. Nevertheless it helped in ridding the roads of thousands of old cars and in selling new ones. . . . Canadian Packard Motor Car Co. has leased a three-story building at St. Luke and Carroll Streets, East Windsor, Ont., and will move equipment there from its present plant at Church and Chatham Streets. Added facilities to be installed prior to production of the lower-price Packard about Jan. 1 will raise the capacity from 300 cars a year to 4000 cars. The plant will supply the Canadian, English and Spanish markets.

Murray Corp. of America is asking bondholders to extend for 10 years \$1,750,000 worth of its 6½ per cent 10-year bonds, due Dec. 1, 1934. Of the original issue of \$4,000,000 offered in 1924, \$2,250,000 has been purchased and redeemed. . . . Chrysler Corp. is to call in \$10,000,000 of its Dodge Brothers bonds, thus reducing fixed charges \$500,000 a year. . . . Employment in Detroit stood at 70.8 on Sept. 15, according to the index of the local Board of Commerce. On

Sept. 1 the index was 70.2 and on Sept. 15 a year ago 64.5. . . . Graham-Paige is reported to be dickering with Continental Motors for purchase of dies for the Continental four-cylinder Beacon. If Graham should go ahead with the deal, it is assumed that it would buy the motors from Continental. . . . Factory shipments of Hudson Motor Car Co. in the January-August period totaled 72,715 cars, compared with 40,982 in all of 1933.

#### Chrysler Rushes New Models

With introduction of the new V-eight Ford postponed until near the end of the year, Chrysler is understood to have shifted its strategy and now is rushing the start of operations on new cars in all of its divisions. Parts suppliers have received releases from Chrysler for shipment of materials beginning about Oct. 1 and steel mills the past week booked tonnages of various steel items covering Chrysler's requirements for its first production runs. Aside from slight alterations in front-end appearance it is believed that Plymouth, Dodge and the Airflow cars will be practically the same as at present. Chrysler evidently is aiming to get the jump on competitors by being the first major manufacturer to offer 1935 models. It is possible that Plymouth may hold back any important changes in design until spring, meanwhile securing what business it can with its new series apparently to be introduced in November.

Ford has not yet given releases of material and parts for the 1935 car, although it has notified suppliers to prepare tools and dies. It is reported that Kelsey-Hayes, which will furnish a portion of Ford's wheel re-

quirements next year, will begin deliveries to Ford branch assembly plants about Nov. 15.

Pontiac has placed its first sheet tonnages for its new six. Oldsmobile is expected to buy sheets in the next two weeks. Fisher body won't have new sheet sizes ready until around Oct. 1 and therefore will not give releases until early next month.

#### Automobile Output Tapering

Automobile production is tapering, the three leading manufacturers, Ford, Chevrolet and Plymouth, having cut down assemblies the past week. In the case of one company, output was curtailed because of a lack of bodies, which in turn was caused by materials shortage due to the textile strike. Car production this month is put at 165,000 units, or slightly under previous estimates.

Studebaker resumed operations last week after a two weeks' shutdown. Pierce-Arrow and Lincoln are closed, the latter being in the midst of preparations for manufacture of a light twelve. It is believed that a considerable number of the parts for the new Lincoln will be turned out at Ford's Rouge plant.

The National Automobile Chamber of Commerce has filed a request with the Steel Institute that Detroit be established as a steel basing point. It is assumed that the request is for a Detroit base price on hot strip steel and sheets, as well as on products specified recently in the petition of Rotary Electric Furnace Co., which covered merchant steel bars, cold-drawn bars and cold-rolled strip. It is significant that even the most aggressive advocates of a Detroit base acknowledge privately that they do

not expect the NACC request to be granted at this time. In fact, the automobile industry is divided in its own opinion about the desirability of a Detroit base.

General Motors is placed in the anomalous position of favoring it for local plants and opposing it for plants in other Michigan cities. Nevertheless General Motors has been the most consistent and militant champion of a Detroit base. Ford is in almost as peculiar a position as General Motors. It is not adverse to seeing its competitors pay as much as possible for steel as long as much of its steel needs will be met by its own steel works.

Auburn, Nash, Studebaker and other companies outside Detroit naturally aren't keen for a Detroit base which would give their competitors an advantage in buying steel. It is understood that out-state parts makers have gone so far as to file protests with the Steel Institute against a change in the present method of quoting steel prices.

#### Chevrolet Foundry Well Stocked

It is understood that by the close of the Lake navigation season the Chevrolet foundry at Saginaw will have taken in enough pig iron from a Cleveland steel company to last it through the winter. Chevrolet usually aims to have on hand 60,000 to 70,000 tons of iron. Purchase of an additional tonnage at this time seems to depend on whether it can secure iron at less than the present market price. Contrary to its custom of closing down at this time for a changeover to work on new models, the Chevrolet foundry still is casting blocks and other parts for 1934 cars and probably won't go down until some time in October.

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## Industry Begins to Make "The Next Move"

"If we speak with a collective voice, we will be listened to by the next Congress. If we do not, the professors will continue to speak for us." Thus was concluded the leading editorial in *THE IRON AGE* last week. During the same week, the voice of industry was being rehearsed for action. From various sources come reports that industry is beginning to organize to take collective action against the more objectional features of the New Deal.

In New York last week the first meeting was held of the National Association of Manufacturers' Committee on Future Relations of Government to Industry. Under the chairmanship of James W. Hook, president, Geometric Tool Co., New Haven, Conn., this committee will formulate a definite program reflecting the views of industry upon the proper relationship of Government to business for presentation before January to Congress and the Administration. Details of the committee's plans are covered elsewhere in *THE IRON AGE* this week.

At Hot Springs, Va., the Durable Goods Committee,

appointed last spring at the request of Gen. Hugh S. Johnson to study means of reemployment in the nation's heavy industries, was established as a permanent body. George H. Houston, president, Baldwin Locomotive Works, Philadelphia, will continue as chairman of this committee which will continue its work along the lines of the rehabilitation of the capital goods industries. With its original NRA sponsorship, this group should be a powerful force in constructive legislation.

The New England Council has recently made public the results of a questionnaire sent to its members seeking to find out the reasons for the current lack of confidence in the business and industrial situation. It has also asked for remedies. Both parts of the inquiry brought very interesting comments from New England business men. They apply as well to the rest of the country. Such efforts to secure constructive opinion on current economic difficulties are steps in the right direction.

Business and industry are no longer inarticulate.



## SUMMARY OF THIS WEEK'S BUSINESS

# Expansion in Demand Lifts Output At Leading Steel Centers

National Ingot Rate Rises 2½ Points—Replenishment of Stocks  
And Increase in Automobile Releases Are Factors—Scrap Declines

**A** FURTHER rise in steel demand, accompanied by a two and one-half point gain in production, has buoyed up the hopes of the trade and stiffened resistance to pressure against prices. Part of the increase is attributable to larger releases from the automobile industry, but much of it is due to heavier replenishment buying. Further acceleration of purchases for stock replacement is now looked for, since many steel consumers are believed to have allowed their inventories to fall below normal levels.

While extensive forward contracting seems to be barred by the provisions of the revised code banning price advances during a quarter, sales of a few products have been stimulated of late by the desire to escape increased extras which go into effect Oct. 1. The shadow of possible freight rate increases is also commencing to influence the attitude of the trade. In the case of pig iron, the higher rates, if granted, will increase the costs of assembling raw materials \$1 a ton, according to estimates by Mid-Western producers. Moves in opposition to the rate advance have been taken by three important Ohio steel companies, which have asked to be heard in the Commerce Commission hearings which begin Oct. 1.

**A** MONG other factors encouraging freer buying is the lingering fear of eventual currency inflation, although generally speaking the tone of business is more confident and less uncertain, influenced no doubt by the ending of the textile strike.

A continued negative market factor is scrap, which, though increasingly sluggish, has given further ground, THE IRON AGE composite having receded from \$9.58 to \$9.50 a gross ton. This decline, however, is out of keeping with steel works operations, ingot output having advanced from 21 to 23½ per cent.

The trend of production, in contrast with recent weeks, is now uniformly upward and some of the gains have been substantial. At Chicago output rose four and one-half points to 26½ per cent; in the Wheeling district the increase was five points to 26 per cent, and at Cleveland three points to 24 per cent. Other gains were two points to 15 per cent at Pittsburgh, two points to 18 per cent in the Philadelphia district, and one point to 26 per cent in the Valleys. Detroit continues to lead the country with an unchanged rate of 76 per cent.

**T**HE upturn in operations came at a time when pressure against prices had become severe. In a few cases producers actually filed lower prices, but later withdrew them when they realized that, under the

revised code, the reductions would have to stand until the first quarter of next year. Once prices are cut the die is cast under the code provision barring advances, and hence sellers cannot hope to improve their position on an upswing of demand.

The filing of lower prices on cold-rolled strip by three Detroit companies, although partly due to the constant pressure of the automobile industry for reductions, was more particularly the result of a special competitive condition. Because of the extras on certain widths of strip, consumers in growing number bought sheets and slit them. Now that the reduced base prices have been withdrawn, this situation will probably be met by a complete revision of the present extra card.

**A** NOTHER petition for a Detroit base on various steel products has been filed with the steel institute, this time by the National Automobile Chamber of Commerce. Actually, the attitude of the automobile manufacturers toward Detroit basing is divided, those with plants in Detroit favoring it and those outside opposing it.

Structural steel awards of 6030 tons compare with 17,650 tons in the previous week and 8900 tons two weeks ago. New projects of 33,265 tons, including 23,000 tons for highway bridges in Missouri, are the third largest this year. The Great Plains shelter belt, for which bids on 25,000 tons of fencing were to be taken next month, has been pushed into the background by a ruling of Comptroller McCarl forbidding the use of more than \$1,000,000 for the project.

The Administration's home modernization program has not yet affected the iron and steel industry, but an analysis of a representative group of loans made to date indicates that nearly 30 per cent of the expenditures will be for heating and plumbing.

Most railroads have clamped down on their purchases, but the Chicago & North Western has asked for a PWA loan of \$5,650,000 to finance repairs to 160 locomotives, modernization of 38 steel coaches, air conditioning of 45 passenger service cars, and general maintenance work.

Export inquiries include 5000 to 6000 tons of oil country goods and 8000 to 26,000 tons of galvanized locust barriers for the Argentine Government and 14,000 tons of plates and structural shapes for an Argentine refinery.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$17.90 a ton and 2.124c. a lb.

# ▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month, and One Year Previous  
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Sept. 25, 1934	Sept. 18, 1934	Aug. 28, 1934	Sept. 26, 1933
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$20.26	\$20.26	\$20.26	\$18.34
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti.....	19.13	19.13	19.13	18.23
No. 2, Birmingham†.....	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*.....	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.....	19.76	19.76	19.76	17.84
Basic, Valley furnace.....	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	19.89
Malleable, Chicago*.....	18.50	18.50	18.50	17.50
Malleable, Valley.....	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago.....	24.04	24.04	24.04	23.67
Ferromanganese, seab'd car-				
lots.....	85.00	85.00	85.00	82.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

\*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Finished Steel	Sept. 25, 1934	Sept. 18, 1934	Aug. 28, 1934	Sept. 26, 1933
<i>Per Lb.:</i>				
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary.....	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh...	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary..	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh.....	2.60	2.60	2.60	2.10
Wire nails, Chicago dist. mill.	2.65	2.65	2.65	2.15
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., P'gh.....	3.00	3.00	3.00	2.60
Barbed wire, galv., Chicago dist. mill.....	3.05	3.05	3.05	2.65
Tin plate, 100 lb. box, P'gh..	\$5.25	\$5.25	\$5.25	\$4.65

## Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$40.00
Light rails, Pittsburgh.....	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh.	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh.....	28.00	28.00	28.00	26.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh...	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh.....	38.00	38.00	38.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb..	1.70	1.70	1.70	1.60

## Scrap

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh...	\$10.75	\$10.75	\$11.00	\$12.75
Heavy melting steel, Phila...	9.50	9.50	9.75	10.75
Heavy melting steel, Ch'go..	8.25	8.50	9.00	9.62 1/2
Carwheels, Chicago.....	9.50	9.50	9.50	10.00
Carwheels, Philadelphia.....	11.25	11.25	11.25	12.75
No. 1 cast, Pittsburgh.....	11.75	11.75	11.75	11.75
No. 1 cast, Philadelphia.....	11.75	11.75	11.75	12.50
No. 1 cast, Ch'go (net ton)...	8.00	8.00	8.00	10.00
No. 1 RR. wrot., Phila.....	11.25	11.25	11.25	12.00
No. 1 RR. wrot., Ch'go (net)	6.75	6.75	7.25	8.50

## Finished Steel

<i>Per Lb.:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.80	1.80	1.80	1.60
Bars, Chicago.....	1.85	1.85	1.85	1.65
Bars, Cleveland.....	1.85	1.85	1.85	1.65
Bars, New York.....	2.13	2.13	2.13	1.95
Plates, Pittsburgh.....	1.80	1.80	1.80	1.60
Plates, Chicago.....	1.85	1.85	1.85	1.65
Plates, New York.....	2.08	2.08	2.08	1.898
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.60
Structural shapes, Chicago...	1.85	1.85	1.85	1.65
Structural shapes, New York.	2.05 1/4	2.05 1/4	2.05 1/4	1.86775
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	1.95
Hot-rolled strips, Pittsburgh.	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.40

## Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$3.85	\$3.85	\$3.85	\$2.50
Foundry coke, prompt.....	4.60	4.60	4.60	3.25

## Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Electrolytic copper, refinery†.	8.75	8.75	8.75	8.75
Lake copper, New York†....	9.12 1/2	9.12 1/4	9.12 1/2	9.00
Tin (straits), New York....	51.50	51.37 1/2	51.70	47.20
Zinc, East St. Louis.....	4.00	4.00	4.25	4.75
Zinc, New York.....	4.35	4.35	4.60	5.12
Lead, St. Louis.....	3.50	3.55	3.60	4.35
Lead, New York.....	3.65	3.70	3.75	4.50
Antimony (Asiatic), N. Y...	8.75	8.75	8.62 1/2	7.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. †Blue Eagle copper.

# ▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

## Finished Steel

Sept. 25, 1934	2.124c. a Lb.
One week ago	2.124c.
One month ago	2.124c.
One year ago	1.972c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

	HIGH	LOW
1934 .....	2.199c., April 24;	2.008c., Jan. 2
1933 .....	2.015c., Oct. 3;	1.867c., April 18
1932 .....	1.977c., Oct. 4;	1.926c., Feb. 2
1931 .....	2.037c., Jan. 13;	1.945c., Dec. 29
1930 .....	2.273c., Jan. 7;	2.018c., Dec. 9
1929 .....	2.317c., April 2;	2.273c., Oct. 29
1928 .....	2.286c., Dec. 11;	2.217c., July 17
1927 .....	2.402c., Jan. 4;	2.212c., Nov. 1

## Pig Iron

\$17.90 a Gross Ton
17.90
17.90
16.71

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
17.90, May 1;	16.90, Jan. 27	
16.90, Dec. 5;	13.56, Jan. 3	
14.81, Jan. 5;	13.56, Dec. 6	
15.90, Jan. 6;	14.79, Dec. 15	
18.21, Jan. 7;	15.90, Dec. 16	
18.71, May 14;	18.21, Dec. 17	
18.59, Nov. 27;	17.04, July 24	
19.71, Jan. 4;	17.54, Nov. 1	

## Steel Scrap

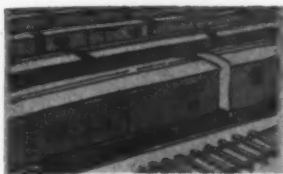
\$9.50 a Gross Ton
9.53
9.92
11.04

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW
\$13.00, Mar. 13;	\$9.50, Sept. 25	
12.25, Aug. 8;	6.75, Jan. 3	
8.50, Jan. 12;	6.42, July 5	
11.33, Jan. 6;	8.50, Dec. 29	
15.00, Feb. 18;	11.25, Dec. 9	
17.58, Jan. 29;	14.08, Dec. 3	
16.50, Dec. 31;	13.08, July 2	
15.25, Jan. 11;	13.08, Nov. 22	



# Operations Rise in Pittsburgh, Valley and Wheeling Areas



**Gain in Bookings Is Gradual But There Are Indications That Consumer Stocks Have Been Reduced Below Normal**

**P**ITTSBURGH, Sept. 25.—Demand for finished steel, while still abnormally light, reflects further improvement. With the exception of shipments for public works projects, practically all finished steel products are being ordered on a spot basis. Consequently the uptrend in daily volume is very gradual. Perhaps the greatest obstacle to a sharp upswing in steel bookings at this season is the fact that forward buying of steel under the present code contract is practically a discarded custom. Hence the usual bulge in fall buying will not be swelled by widespread quarterly contracting this year. General business, moreover, is still enshrouded with uncertainty and liquidation of steel stocks is believed to have progressed beyond the normal inventory limits. The forward outlook has been brightened by the ending of the textile strike, with some steel orders already appearing from consuming quarters that had been more or less paralyzed by the strike.

Although in the aggregate a very substantial tonnage of heavy hot-rolled steel pends for public works projects, the benefit to mill schedules will be spread very thin, since delivery usually extends over prolonged periods. Automobile makers and parts manufacturers are ordering more freely, but aggregate volume of such business received in this district is not yet significant.

Ingot production in the Pittsburgh district this week will average two points higher at 15 per cent. Production in the Valleys and nearby northern Ohio mills is up one point to 26 per cent. Production in the Wheeling district is five points higher at 26 per cent.

Sheet and strip mills in most cases are stepping up production this week, while tin plate operations are sustained at 45 per cent.

Cold-rolled strip has been reaffirmed at 2.60c., Pittsburgh, for fourth quarter shipment by all important producers.

## Pig Iron

Small-lot orders for foundry grades are being placed more freely. No improvement is in sight for basic or Bessemer demand. Ingot mold manu-

facturers are busier, but are not adding significant tonnage to furnace order books. With few exceptions, small melters are expected to restrict purchases to spot needs during the remainder of the year, since buyers are protected against higher prices. Current quotations, which apply through fourth quarter, are fairly steady.

## Semi-Finished Steel

Wire rods and skelp are more active, while sheet bars for tin plate conversion are holding their own. Disposition on the part of non-integrated mills to place fourth quarter contracts is generally lacking, and backlogs of semi-finished grades are well depleted. Billets, blooms and slabs are steady at \$27, while sheet bars are firm at \$28, Pittsburgh. Skelp and wire rods are likewise firm at present base prices. No early revisions in current price schedules are being openly considered.

## Bolts, Nuts and Rivets

Fourth quarter contracting has gotten under way, with consumer response fairly satisfactory. Any previous reluctance on the part of consumers to commit themselves for that period has been overcome by the establishment of lower prices last week, clearing up the unsettlement that had ruled earlier in the third quarter.

## Rails and Track Accessories

Fresh tonnage is limited to routine requirements of track accessories, with rail orders entirely absent. The local rail mill is engaged largely on sheet bars.

## Bars

A more regular flow of small-lot orders is reported by the leading producers. Practically all activity is on a spot basis, with no consuming industry predominant in the current movement. Interest from the automotive industry is more evident but is not reflected in bar tonnage. The Pittsburgh base price of 1.80c. on hot-rolled bars is firm.

## Reinforcing Steel

Bids will be taken on Oct. 16 by the Pittsburgh Flood Commission on about 950 tons for the Tygart Valley dam near Grafton, W. Va. Several large public projects pend, but producers expect little immediate benefit even

when contracts are let, since most of the large dam jobs will require from six months to two years for completion. The Fort Peck, Mont., dam, for example, under general contract terms will take about 23 months. The supplier of reinforcing steel will, therefore, have to protect the contractor for the entire period at current prices and may be required to spread shipments almost for the entire life of the construction work. The Pittsburgh base price for billet steel reinforcing in straight lengths as quoted by distributors is firm at 2.05c.

## Cold-Finished Steel Bars

Bookings in the past week reflected a slight improvement in miscellaneous demand. Jobbers' stocks are still fairly ample, and no general replenishment move has started. No action has thus far been reported on an application filed by a Detroit producer for the establishment of Detroit as a base for cold-finished steel bars.

## Plates and Shapes

Fresh structural inquiries are featured by 1000 tons for a bridge over Merrimac River at Lawrence, Mass., and 2200 tons for Mississippi River dam No. 6. at Trempealeau, Wis. Highway bridges account for practically all of the remaining new items. Awards in the past week reported here were unusually light. Although no definite figures are available covering probable steel requirements for the Allegheny County Authority work in the Pittsburgh district, it is considered likely that around 25,000 tons of structural steel will be needed for bridge and tunnel construction. Very little new business in the plate market is reported.

## Wire Products

Demand for manufacturers' wire and spoke wire has improved. Orders for nails and other merchant items are also more frequent. Aggregate volume, however, still is far below normal, and wire mill schedules continue to fluctuate from week to week. Present operations average not more than 20 per cent.

## Tin Plate

Defying early predictions, operations are holding this week at about 45 per cent. The sustained activity, however, is due chiefly to export orders and specifications resulting from the Federal slaughtering program. General specifications continue to reflect seasonal decline.

## Tubular Goods

September volume in a majority of cases is expected to surpass that for August. The gain for the month, however, will be very moderate. The improvement in bookings is traceable chiefly to a fair demand for oil country goods. Drilling activity is reported to be increasing, and pipe mills expect a more substantial flow of orders in the near future. The Argentine Government is in the market for

its annual requirements of oil country goods, reported to approximate 5000 to 6000 tons. This business, if placed, will probably be allocated among a large number of pipe mills. The Tygart Valley dam, on which the Pittsburgh Flood Commission will take bids on Oct. 16, will require 526 tons of steel pipe and fittings. Movement of standard pipe out of warehouse stocks is seasonally heavier, but mills have not benefited measurably thus far.

#### Sheets

Sheet mill operations this week will average higher at 20 to 25 per cent. Leading producers report a notable improvement in orders in the past week, with bookings representing a well diversified demand. Electric motor manufacturers, auto body makers, agricultural implement manufacturers and electrical equipment interests have all increased their takings of sheets. It is reported that several thousand tons of black sheets and galvanized sheets are being inquired for in connection with the rehabilitating of areas devastated by the recent typhoon in Japan.

#### Strip Steel

All important cold-rolled strip producers are established on a basis of 2.60c., Pittsburgh and Cleveland, for delivery through fourth quarter. Some steps will likely be taken to meet the growing competition from the use of cold-finished sheets which are being slit by consumers to desired strip widths. No changes in the base price, however, are being contemplated. Hot-rolled strip is unchanged at 1.85c., Pittsburgh. Scattered improvement in orders has enabled some producers to accelerate rolling this week. Automobile manufacturers and parts makers, while not increasing their takings to any great extent, are manifesting more interest in this market.

#### Coke and Coal

Furnace coke will be quotable at \$3.85, and ordinary foundry coke at \$4.60, f. o. b. Connellsville ovens, for shipment through fourth quarter. Premium brands are quotably unchanged at \$5.10, ovens. Activity in coke and coal is largely unchanged, the only feature being a further seasonal improvement in demand for domestic size fuels.

#### Scrap

Mill purchases have established compressed sheet steel 25c. a ton lower. Since disposition of scrap on the railroad lists early in the month, very little tonnage has been moved in this district. The recent uptrend in ingot production has been too gradual to necessitate the bolstering of mill inventories. At the present operating rate little encouragement is offered for any important buying during the remainder of September. Some moderate buying is believed to be in the making for early October. Current

shipments are notably sluggish, with only two or three mills in this district taking scrap. A broker is offering \$9 for No. 2 heavy melting steel and \$10 for No. 1 steel for delivery in a nearby district, but is covering only meagerly at those prices. In the

Pittsburgh district no firm offers to sell at below the current quotational ranges are in evidence. It is likely, however, that some concessions in current prices for heavy melting steel would be necessary to draw consumers into the market.

## Steel Demand Shows Further Moderate Improvement in Valleys

**Y**OUNGSTOWN, Sept. 25.—Further moderate improvement in the past fortnight is reported by Valley steel producers. The most encouraging feature is the broadening tendency of demand, indicating that the heavy stocks accumulated by consumers in second quarter have been liquidated to the replenishing point. Current interest in steel is manifested chiefly by consumers. Jobbers, except in unusual instances, still are not accounting for a measurable share of recent shipments. An exception to that rule is in the South and Southwest, where calls for wire, sheets and other agricultural items are frequent.

The betterment in steel bookings has not thus far led to a vigorous increase in open-hearth activity. If orders continue to increase, however, additional capacity will likely be engaged this week. Since Sept. 1, finishing mill schedules have been extremely erratic, with operations fluctuating in concert with the irregular influx of orders.

Sheet and strip operations this week are higher, with some units scheduled at about 25 per cent. Sheet and strip specifications from the automotive industry are slightly heavier. Releases on tin plate orders are diminishing, but the seasonal decline is offset partly by export business. Tin plate producers here do not expect to benefit further to any great measure by the Government meat-packing program.

Soft steel bar tonnage has been swelled by improved demand from agricultural implement manufacturers, while demand from the railroads and cold-finishing mills has not been particularly encouraging. Fabricators of reinforcing bars are fairly busy. Pipe mill schedules are practically unchanged, but increases are considered soon likely, since replacement buying of oil country goods is believed imminent. Renewed drilling at some oil fields, where activity had been interrupted by drought conditions, is expected to bring in some fair orders for drill pipe and casing.

The improvement in the steel market has not extended to raw materials. Pig iron buying continues almost entirely on a hand-to-mouth basis. Forward contracting for next quarter has not begun. Scrap is still lifeless,

with the market largely nominal. No. 1 heavy melting steel is available at around \$10.75. Shipments to the leading consumers are very restricted. The only activity in the fuel markets here centers in domestic-sized coke, which is being handled largely by truck.

## Bids to Go In On Navy Steel Oct. 12

**W**ASHINGTON, Sept. 25.—The Navy Department will begin its steel buying for the 13 ships to be constructed at navy yards in connection with its new building program on Oct. 12, when bids will be opened for 4406 tons of plates, sheets, steel bars and strips. In all, the steel requirements for the 13 vessels are estimated at approximately 22,000 tons.

The initial opening will be for five destroyers to be constructed at the Boston, Norfolk, Mare Island and Puget Sound yards. The steel requirements consist of 3120 tons of plates, 3/16 in. and heavier, of which 1320 tons will be black plates and 1800 tons galvanized material; 1300 tons of black and galvanized sheets, 4, 5, 6 and 7 lb. per sq. ft.; 256 tons of steel bars and 129 tons of strips.

This is the first large steel tonnage asked for by the Government since President Roosevelt on June 29 in an executive order said it would be no violation of codes for bidders to submit prices as much as 15 per cent below the formally filed code levels. So far the steel industry has not deviated from the regular code prices in presenting bids for Government business.

## Navy to Open Bids On Steel Bars

**W**ASHINGTON, Sept. 25.—The Bureau of Supplies and Accounts, Navy Department, will open bids on Oct. 12 for 265 tons of steel bars and approximately 127 tons of strip steel for five destroyers being built at the Puget Sound, Wash., Mare Island, Cal., Norfolk, Va., and Boston navy yards.



# Output Up Four and One-Half Points at Chicago



Rise to 26½ Per Cent Rate Is Largely Due to Expansion in Automotive Orders —Scrap Declines Further

CHICAGO, Sept. 25.—Ingot output is up four and one-half points to 26½ per cent of capacity. This gain is traceable almost wholly to larger orders for sheets from automobile manufacturers. One hot mill unit has stepped up operations from under 20 per cent to about 35 per cent. Activity in the automobile trade is also indicated by reports that Ford is seeking supplies of scrap at numerous Great Lakes ports. Foundries that cater to the automobile industry are melting slightly more iron, while on the other hand foundries that make railroad equipment parts are on the verge of shutting down.

The week has not been without its quick moves in the matter of prices. One Western mill, after having filed a reduction of \$5 a ton on woven wire fencing, withdrew its new price and returned to the generally accepted price level.

New extras on wire and wire products, many of them higher than on the old cards, go into effect Oct. 1 and a substantial part of current bookings, relatively small as they are, can be attributed to the desire of consumers to save the margin between the old and the new extras.

Chicago architects find little in the picture that will lend encouragement to fabricators, even Government work being light in this area. Loans to home owners so far have not stimulated the movement of nails, roofing and galvanized products.

## Pig Iron

Shipments of Northern foundry iron are running 50 per cent above August, but the aggregate tonnage is far from impressive for the reason that last month's volume was near the low point of the year. Much of the pick-up comes from automobile foundries. Sellers are studying the price structure in relation to proposed freight advances. It is now estimated that should the railroads obtain advances it will cost pig iron producers at least \$1 a ton more to assemble raw materials than at present. Contracts for fourth quarter are scarce but spot buying is on a higher plane.

## Reinforcing Bars

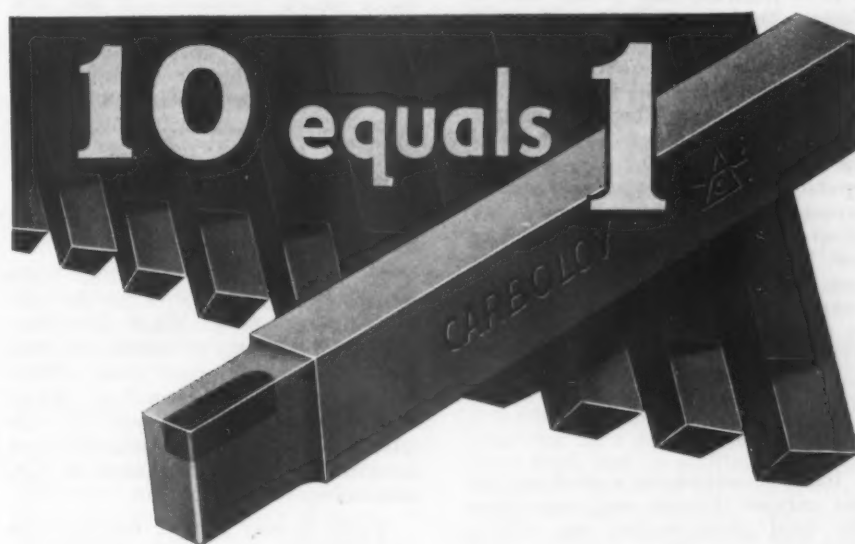
Demand for this commodity is dragging except for a moderate vol-

ume of highway work and scattered projects to be undertaken with Government funds. The bars for the Decatur, Ill., post office should be ordered soon, the general contract being in the hands of a St. Louis firm.

Acme Steel Co., Riverside, Ill., is planning alterations and has placed 300 tons. Orders have been issued for 100 tons for a school building at Moline, Ill. There is a noticeable drop both in buying and inquiries from private interests. This is disquieting to the trade for the reason that the August pick-up in that phase of the market was taken as a good omen.

## Sheets

Mills have stepped up operations fully 15 points, following rather liberal purchases and releases by the automobile industry. In fact, much of the gain found in open-hearth output can be traced directly to this situation. The interest of automobile manufacturers in steel at this time leads sellers to believe that some of the new models are nearer actual production



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machining speeds obtained and the ability of Carboloy tools to machine harder materials.

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## CUTTING AND WEAR-RESISTANT TOOLS

lines than is generally believed. The general manufacturing trade remains inactive, though some signs point to larger use of sheets in October. The roofing trade is dormant in spite of the Government's efforts to get money into the hands of home owners for improvements and repairs. Hot mills are now operating at 33 per cent of capacity.

### Rails

This market is quiet except for the interest being shown in improving tracks for the new high-speed trains. While steel men do not expect immediate results they believe that eventually the demand for a higher type of track construction will assume important proportions. The joining of hands by the American Railway Association and the railway executives group is looked upon as a constructive move.

### Wire Products

It is reported that a mill west of Chicago that had filed a fence price \$5 a ton below the general market level has withdrawn that quotation. Mills continue to ignore the nail price war that is being waged between mail order houses and jobbers. On the whole, the price structure for wire and wire products has taken on a more stable aspect. On Oct. 1 new extras go into effect that in most instances will result in higher quotations to consumers. Some users, in anticipation of the changes, are now entering orders to be filled under the old card of extras. These protective moves constitute the only change in the market from a week ago.

### Plates

Improvement shown a week ago has not carried through and once again the local plate market has slipped away almost to the vanishing point. Carloads and less are the rule and they come from widely scattered points and from miscellaneous users.

### Cast Iron Pipe

The only new inquiry of note is for 320 tons of 36-in. pipe for Chicago. Many PWA jobs have now been bid on, but red tape must be followed and pipe awards for many of these projects may be delayed for a month or more.

### Bars

An interesting development in this market is the fact that automobile manufacturers are taking more bars, and inquiries point to a further expansion of their orders. Farm implement manufacturers are also entering the market in a more liberal way, but they have not yet given assurance that they are definitely on the way to substantial production schedules. Tractor builders are following through with the best schedules of any major industry represented in the Middle West.

### Structural Material

Inquiries have been pulled far above their usual level by the State of Missouri, which has entered the market for bridges calling for 23,000 tons of plates, shapes and bars. The total of fresh inquiries is 24,000 tons and new purchases, far less imposing, stand at 3000 tons. Conditions are not promising in the immediate Chicago territory, though fabricators here will soon have opportunity to enter bids on the two dams across the Mississippi River.

### Scrap

Prices continue to give ground, as evidenced by all steel mill grades, which have dropped 25c. a ton. These lower prices are freezing supplies, and no excess scrap is appearing on track. Mills are tending to place new restrictions on the number of cars that they will accept from day to day. One large consumer states that he is out of the market for not less than 30 days, and possibly 60 days. There continues to be a small movement of the cast grades. Part of this material is going to foundries that have Government work, while some of it is being taken in as a speculative move.

## Pig Iron Sales Rise At St. Louis

ST. LOUIS, Sept. 25.—Bids have been asked for Oct. 8 for the substructure of the St. Louis post office, requiring 275 tons of reinforcing bars and 375 tons of steel sheet piling. Plans on the superstructure, which are being revised, are nearing completion. Klipstein & Rathmann are architects, and W. J. Knight & Co., engineers.

Trade is very slow in finished iron and steel, due to a continuation of the overstocked condition which has prevailed for some time and to the buyers' watchful waiting policy. Reports are that warehouses in Kansas have been experiencing a marked improvement in business, although business is quiet with such factors in Missouri and southern Illinois.

A marked pick-up in the melt of foundry iron is reported in a number of lines. For instance, the agricultural implement makers in Peoria and in the Moline district, whose inventories are said to be extremely low, are making up goods for stock, to be shipped next spring, when they expect a big business. One company has recently employed 500 additional workers. Stove plants in the territory also report improvement. Jobbing foundries are showing the heaviest gains, it is reported, business coming to them from all lines. Sales of pig iron are heavier than for some time, one melter having bought 1000 tons. Spot business of carloads up to 200 tons also is increasing. September shipments by the Granite City

maker are expected to be two or three times what they were in August.

Employment by the Commonwealth division of the General Steel Castings Corp. is being gradually stepped up from 800 to 1500 persons to execute an order from the Pennsylvania Railroad for one-piece steel underframes for 1000 new 70-ton flat cars. American Car & Foundry Co. is engaged in filling a contract for 150 new box cars in its plant at 2800 DeKalb Street, as a result of a PWA loan of \$232,000 to the Gulf, Mobile & Northern for their purchase.

An East Side mill has bought a round tonnage of No. 1 heavy melting steel at \$1 a ton less than the preceding purchase of this item, resulting in a corresponding reduction in the price being paid by dealers. Other mills are showing interest in requirements. St. Louis-San Francisco has a list of 35 carloads of scrap.

## Sheet Bookings Rise At Cincinnati

CINCINNATI, Sept. 25.—A 10-point increase in sheet mill bookings during the month has contributed a more stable background to the uncertain market. Demand is without particular feature, but covers a wide variety of urgent requirements. None of the sheet consumers has increased manufacturing operations, although indications from radio, automobile and domestic equipment makers are encouraging. The leading district interest is spreading work over all its units, although the heaviest rolling schedules are maintained at Middletown and Ashland, with emphasis on finishing at Butler, Pa.

Current demand for pig iron is below last year's level, as well as furnace expectations. Bookings are confined to carload lots and do not exceed 300 tons in the aggregate. In the absence of a price incentive for forward buying, any rise in demand must be the result of an increased melt. Foundries, however, are only operating a few days a week.

Movement of by-product foundry coke outside metropolitan Cincinnati is slightly better, but shipments into the city are at last month's rates. Domestic grades are sluggish.

Continued weakness in scrap is reflected in lower bids on recent railroad lists. Dealers' quotations are nominal, scrap being worth whatever can be obtained.

## Railroad Equipment

Chilean State Railways are inquiring for 10 locomotives of the 4-8-4 type.

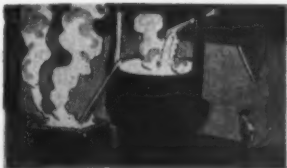
National Railways of Mexico contemplate buying 1000 box cars of 40 tons capacity.

Chesapeake & Ohio has inquired for 300 tons of tie plates.

Norfolk & Western is in the market for 100 tons of track spikes.



# Miscellaneous Orders Increase In New York District



**Sheet Jobbers and Others Replenish Stocks  
—Additional Government-Financed Construction Work Is Authorized**

**N**EW YORK, Sept. 25.—Steel bookings have shown another moderate gain, largely as the result of replenishment purchases. Orders for sheets for restocking purposes have been in fair volume, especially from the warehouse trade. Miscellaneous manufacturing consumers are also making cautious purchases of fill-in lots. There continues to be a steady flow of miscellaneous small-tonnage orders from pipe jobbers, but these releases are usually for specific PWA projects rather than for stock replenishment.

Government-financed construction work continues to be a mainstay of the market. The Federal office building and post office, New York, on which bids will be taken Oct. 2, will require 500 to 1000 tons of sheet steel piling besides upward of 17,000 tons of structural steel. Public Works Administrator Ickes has announced the allotment of \$1,198,300 for the construction of five health center buildings in this city, \$468,700 for removal and reconstruction of a bridge over the Wallabout Canal, Brooklyn, and \$306,000 for a local hospital.

An export inquiry from Argentina for corrugated galvanized sheets for locust barriers calls for 8000 to 26,000 tons, depending on whether light or heavier gages are bought. Last year 12,000 tons was bought, and in pre-depression days annual purchases usually amounted to about 40,000 tons.

The Standard Oil Co. of New Jersey is in the market for 12,000 to 14,000 tons of structural steel and plates for the reconstruction of an Argentine refinery recently destroyed by fire.

The New York Central will take Clayton act bids September 28 on miscellaneous requirements for fourth quarter.

The provision in the revised code banning price advances once reductions are made in a given quarter is causing steel companies to hesitate before definitely committing themselves to a lower market level. Detroit companies which filed reductions on cold-rolled strip last week later withdrew them, and it is now

likely that the competition from cold-finished sheets will be met by a general revision of strip extras.

## Pig Iron

Sellers here are figuring on a number of small-lot inquiries but new sales of foundry iron are far from impressive. About 1650 tons of fresh business was booked last week, as compared with 2000 tons in the preceding period and 4100 tons two weeks earlier. An expected demand from foundries making heating equipment has failed to appear in large volume as their seasonal activities are considerably below the rates of previous years. Other foundries are operating in a hand-to-mouth manner and are consequently not interested in commitments other than those to cover immediate needs. This buying hesitancy is furthered by reports of possible price declines in other districts.

## Reinforcing Steel

Local sellers are figuring on a number of small jobs and bids are in on 1000 tons of bars for miscellaneous work for the Department of Parks of the city of New York. In addition, tenders will be taken until Oct. 4 on 850 tons for the Hart Island piers of the Tri-Borough bridge, New York. Fresh awards during the past week consisted mostly of mesh for highway work throughout New York State for which approximately 600 tons was placed. The American Steel & Wire Co. will also furnish 400 tons of mesh for highway construction in West Virginia. About 400 tons of bars for Hudson River pier sheds at New York was awarded to Carroll-McCreary Co., and Igoe Brothers will supply 360 tons for a sewer in Brooklyn.

## Scrap

There is a somewhat better feeling in this district because of expected improvements in mill operations. However, such betterment has not yet been translated into actual scrap sales. The domestic market continues to be almost featureless, and activity is confined to odd carlots of No. 1 and No. 2 steels moving from northern New Jersey points to Coatesville and other eastern Pennsylvania consuming points.

Foreign purchasers are still satisfied to buy scrap at present prices and scrap markets along the Atlantic Coast are therefore in a better position than those inland. In this territory boats are loading No. 1 steel for England and Japan, some No. 1 machinery cast is moving to England and Continental ports, and collections of No. 1 and No. 2 steel are being made for Italy and Poland. All brokers' buying prices are unaltered from last week and apparently firm.

## Bids Taken on Large Cast Pipe Tonnage

**S**AN FRANCISCO, Sept. 24.—Bids on 7469 tons of cast iron pipe for a high-pressure system at San Francisco featured a week of limited activity. Specifications call for 12 to 20-in. pipe of Class A to H. United States Pipe & Foundry Co., which bid \$348,250, was the only bidder. An award is expected shortly.

Little change is noted in mill operations, which continue at a low rate. Price changes are not expected for the remainder of the year. Warehouse business not only has held its own but has shown slight gains in some products during the third quarter. Exports of scrap to the Orient continue active.

New inquiries reported in central California during the week were more numerous. A school at South San Francisco, calling for 600 tons of reinforcing bars and 120 tons of structural steel, and an auditorium at San Jose, Cal., requiring 700 tons of structural steel and 300 tons of reinforcing bars, were the outstanding new projects. Bids taken in March for a bulkhead at Government Island, Cal., have been rejected and new figures will be taken shortly. Approximately 3200 tons of steel sheet piling were included in the specifications. Bookings during the week were the lightest of any week during the present quarter.

## Detroit Scrap Prices Unchanged

**D**ETROIT, Sept. 25.—A deadlock continues to exist between local scrap dealers and district steel mills regarding prices. The latter are trying to purchase heavy melting steel and hydraulic bundles at 50c. to 75c. a ton under the market. There are increasing signs, however, that dealers do not intend to yield under this pressure. Meanwhile quotations remain nominally at the same level as a week ago.

# Cleveland Rate Rises From 21 to 24 Per Cent



**Gain Due to General Depletion of Stocks  
and Increased Automotive Demand—  
Scrap in Further Drop**

**C**LEVELAND, Sept. 25.—Demand for finished steel improved somewhat the past week. The gain was confined to bars, sheets and strip steel and is due mostly to the placing of orders for forged and stamped parts by some of the automobile manufacturers. Some business in malleable castings for the Ford Motor Co. has helped to improve the demand for pig iron. Ingot output in the Cleveland-Lorain territory has increased for the second consecutive week, now being at 24 per cent of capacity, a gain of three points, which is due to the starting up of another furnace in Lorain.

Expectations by some that there would be quite a seasonal improvement in the demand for finished steel this month have not been realized. However, the tonnage booked in September will show a gain, although only a slight one, over August and, with some renewal of the demands from the motor car industry and the depletion of stocks by miscellaneous consumers, a more marked improvement is looked for during October. While demand is still for small lots and the number of orders has not gained, the size of orders has increased with some mills.

As not much activity in the structural field is looked for during the remainder of the year and only a negligible amount of business from the railroads, whatever gain there is in business during the fourth quarter must come largely from the automotive industry, makers of refrigerators and other household appliances and miscellaneous consumers.

A price disturbance that threatened to lead to a destruction of the price structure on several finished products and halted the placing of some business has been cleared up by the withdrawal of the \$5 a ton reduction on cold-rolled strip that was filed by a Detroit producer. Steel-making grades of scrap have been reduced 50c. a ton.

## Pig Iron

New demand shows further gain. The Ford Motor Co. has released some new orders for malleable castings, which has stimulated the demand for this grade of pig iron and some new business has come from automobile parts plants. A leading

producer will ship 30 per cent more iron in September than in August, which indicates that the number of producers who are running out of iron is increasing. Orders range from car lots to 200 tons. An encouraging factor in connection with the improved demand is that the iron is for immediate needs. Considerable comment has been caused by the filing last week with the American Iron and Steel Institute of a \$2.25 a ton reduction to \$16.25, Cleveland, by a local producer, but this price was subsequently withdrawn. In this connection a report that the General Motors Corp. was negotiating for a large block of iron is discredited, as it is claimed that this corporation has enough iron to last until next May. Any lowering of pig iron prices probably would be vigorously objected to by foundries that are carrying good stocks.

## Bars, Plates and Shapes

Some new business in automobile forgings has been placed in this territory and this has slightly stimulated the demand for bars. A fair number of orders for shapes are coming from fabricators who recently have taken many small orders for Ohio highway bridge work. Activity in the structural field is very light. The only awards are for a bridge in Cincinnati and an industrial building in East Liverpool, aggregating 255 tons.

## Sheets

The recent placing with stamping plants in this territory of some orders for automobile parts for Chevrolet and Plymouth cars was reflected in a gain in business from that source the past week and there was a slight increase in miscellaneous orders. No sizable orders came from the Detroit territory. Stove manufacturers are maintaining increased operations on new models. Producers are still making shipments against orders recently placed by refrigerator manufacturers. Mill operations show little change this week, but some producers expect to accumulate enough tonnage to operate better next week.

## Strip Steel

For the first time in several weeks orders improved moderately during the week. Some small-lot business came

from General Motors parts plants, which had bought no strip recently, and there was a better scattered demand in this immediate territory. Cold-rolled strip is unchanged at 2.60c., Cleveland, the 2.35c. price filed by a small Detroit mill having been withdrawn.

## Scrap

A Youngstown district consumer a few days ago purchased about 2000 tons of No. 1 heavy melting steel at \$10.25. Locally there is no new consumer demand. Prices have declined 50c. a ton on heavy melting steel and several other grades, but are unchanged on blast furnace scrap. Some local heavy melting steel scrap is being sold to dealers in the Youngstown district at \$10 for No. 1 and \$9.25 for No. 2, that being the only outlet at present for steel-making scrap produced here. The present quoted prices are used by dealers as a basis for buying scrap from producers, but dealers say they would not take mill orders at those figures.

## Buffalo Mills Hold Recent Gains

**B**UFFALO, Sept. 25.—The Lackawanna plant of the Bethlehem Steel Corp. is continuing its last week's operation of five open-hearth. Republic Steel Corp. continues to operate three and Wickwire-Spencer one. The Seneca sheet division of Bethlehem is running at 15 to 20 per cent of capacity.

Structural fabricating shops report more than the usual number of small-sized jobs, but few large ones are out. A local fabricator has the contract for 165 tons for an addition to the Atcheson Graphite Co., at Niagara Falls, N. Y.

The largest consumer in the district is apparently in the market for scrap, some tentative offers having come out. This is the first time in months that this interest has sought tonnage. The offering price for No. 2 heavy melting steel is \$8, which means that it would take in No. 1 at \$9.50. This figure does not interest most of the dealers who are asking \$10 for No. 1.

Barge canal shipments throughout the season show that to date about 10,000 tons of Upper Lake scrap has gone through to seaboard for eventual shipment to Japan.

The pig iron market is quiet, with an improvement in the volume of small tonnages for immediate shipment. While foundry melt is spotty, it has improved rather than fallen back. Bethlehem's Lackawanna plant and Republic each have one furnace in blast, while Hanna Furnace Corp. is operating two, one on merchant iron and one on silvery.



# Steel Production Rises In Eastern Pennsylvania



**Output Up to 18 Per Cent of Capacity  
With Finished Steel Orders Continuing  
To Improve Slightly — Railroad Inquiry  
Still Pending**

**P**HILADELPHIA, Sept. 25.—Although the trend of finished steel orders in this district still seems to be tending upward, the change is so slight that it is hardly perceptible in many cases. Mills, however, have generally received more tonnage thus far in the month than in August and the current volume of orders compares rather favorably with the first week of the month. The most unsatisfactory aspect of the situation is the small size of orders. Tonnage business is entirely lacking and most of the releases now reaching mills are too small to be profitable.

The district ingot producing rate has risen two points to 18 per cent of capacity. Most of this gain is attributable to the leading interest as the operations of the smaller independent units are unchanged.

The regular quarterly inquiries from the Pennsylvania and the Norfolk & Western will not be acted upon until tomorrow, but the trade does not believe that the full tonnages on which bids have been asked will be bought. At least, the fall repair programs of these two carriers are not believed to be extensive.

The Navy Department has not yet taken action on the steel required for the vessels to be built in its own yards, but may ask for bids on some of this material next month. In the meantime, releases against the program already under way are coming in very slowly.

Public works activity in this district is confined largely to road work. At least 20 projects of this sort are up for bids, but scarcely any structural steel is involved. The mesh and reinforcing bar requirements are considerable. The City of Philadelphia is contemplating the purchase of a quantity of fabricated steel pipe but funds for the work are not yet available.

## Pig Iron

Shipments of iron this month are running as much as 50 per cent ahead of August with some makers, but are still at a very low level. No tonnage buying is reported and consumers are showing little interest in their forward requirements. The larger users

are particularly well covered and operations among the small foundries are not improving.

## Imports

The following iron and steel imports were received here last week: 492 tons of chrome ore from Greece; 403 tons of pig iron from British India; and 18 tons of structural shapes, 13 tons of steel bands, and 10 tons of steel bars from Belgium.

## Bars, Plates and Shapes

The quarterly requirements of the Pennsylvania and the Norfolk & Western, on which bids will be opened tomorrow, are the center of interest in this market. However, the tonnages contracted for are not expected to be large, and the Pennsylvania will

likely pursue its usual policy of placing contracts with a number of mills for 1 per cent of its requirements. The market otherwise is very dull, but releases of bars and plates for miscellaneous work are a bit heavier. The structural steel market is unusually quiet, as few PWA jobs are coming out in this district. Considerable highway work is in prospect, but only road mesh and reinforcing bars are involved.

## Sheets

Demand from radio and stove manufacturers is well sustained, but demand for sheet steel from other sources is light. The large automobile body plants are not yet entering the market, but some action is expected in the near future. Sheet steel jobbers have not yet exhausted their stocks laid in during the second quarter.

## Scrap

A melter in the district has purchased No. 1 heavy melting steel at \$9.75, following a buy by another user in the previous week at \$9.50. The higher figure is accounted for largely by freight rate differences rather than market strength, although export buying is helping to sustain prices in this district. Dealers are paying \$9.25, port of export, for No. 1 steel to be shipped out of the country. The market on the other grades is untested and prices are nominally unchanged.

## Pipe Lines

Standard Oil Co. of California, San Francisco, let contract to Lindgren & Swinerton, Inc., 225 Bush Street, for 36 miles 12-in. welded steel pipe line from Rio Bravo, Kern County, west toward Estero Bay, San Luis Obispo County, Cal., comprising west division of proposed 108-mile line from Rio Bravo to oil refinery at Estero Bay.

Board of District Commissioners, District Building, Washington, asks bids until Oct. 1 for quantity of 18-in., for trunk line water supply, including fittings.

Peoples Gas Co., Miami Beach, Fla., authorized construction of steel pipe line across Oleta River for gas distribution.

Iowa City, Iowa, has appointed committee from Board of Aldermen, headed by J. E. Stronks, to have surveys and estimates of cost made for steel pipe line installation for natural gas distribution.

General Purchasing Officer, Panama Canal, Washington, asks bids until Oct. 11 for 1000 ft., with alternate estimates on wrought iron (Schedule 2999).

Oklahoma City, Okla., postponed special election from Oct. 2 to Jan. 16, to approve bonds for \$4,000,000 for pipe line system for natural gas supply, including acquisition of certain existing lines and installation of new mains.

United States Engineer Office, Pittsburgh, asks bids until Oct. 16 for following steel pipe in connection with construction of Tygart River reservoir dam, near Grafton, W. Va.: 26,350 lb. 24-in.; 7800 lb. 12-in.; 956,000 lb. 3-in.; 81,500 lb. 1/2-in., galvanized; 7400 lb. 3/4-in., galvanized; and 70,860 lb. 1 1/2 in., galvanized (Circular 66).

Seattle, Wash., through its purchasing agent, Paul Fredrickson, County-City Bldg.,

will take bids Sept. 27 for furnishing 55,000 ft. of galvanized wrought iron pipe.

## Ensley Mill Running On Rail Order

**B**IRMINGHAM, Sept. 25.—The iron and steel markets are still largely dormant, with new business irregular and in small lots. Finished steel is more active than pig iron as a result of some interest in sheets and wire products. The expected country demand for these, however, has not yet gotten into a good stride.

Foundries, apparently, are still well stocked with pig iron or have need for only small amounts at this time. The market is almost entirely on a spot basis, and orders are usually for a carload or two. There has been comparatively little iron booked as yet for the last quarter.

The Ensley rail mill is operating several days this week on an order for 2000 tons of rail from the Southern Railway System, as previously reported. The steel is being furnished from the Fairfield works.

Open-hearth and blast furnace operations are unchanged, with six open-hearths and five blast furnaces active.

# Prices of Finished Steel and Iron Products

## BARs, PLATES, SHAPES

Iron and Steel Bars		
	Soft Steel	Base per Lb.
F.o.b. Pittsburgh	1.80c	
F.o.b. Chicago	1.85c	
F.o.b. Gary	1.85c	
F.o.b. Duluth	1.95c	
F.o.b. Cleveland	1.95c	
F.o.b. Buffalo	1.95c	
F.o.b. Philadelphia	2.00c	
F.o.b. New York	2.10c	
F.o.b. Birmingham	2.10c	
F.o.b. cars dock Gulf ports	2.20c	
F.o.b. cars dock Pacific ports	2.35c	

Rail Steel		
	(For merchant trade)	
F.o.b. Pittsburgh	1.70c	
F.o.b. Chicago	1.75c	
F.o.b. Gary	1.75c	
F.o.b. Moline, Ill.	1.75c	
F.o.b. Cleveland	1.80c	
F.o.b. Buffalo	1.80c	
F.o.b. Birmingham	2.10c	
F.o.b. cars dock Gulf ports	2.20c	
F.o.b. cars dock Pacific ports	2.35c	

Bullet Steel Reinforcing		
	(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c	
F.o.b. Chicago	2.10c	
F.o.b. Gary	2.10c	
F.o.b. Detroit	2.20c	
F.o.b. Cleveland	2.20c	
F.o.b. Youngstown	2.10c	
F.o.b. Buffalo	2.10c	
F.o.b. Birmingham	2.10c	
F.o.b. cars dock Gulf ports	2.45c	
F.o.b. cars dock Pacific ports	2.45c	

Rail Steel Reinforcing		
	(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.90c	
F.o.b. Chicago	1.95c	
F.o.b. Gary	1.95c	
F.o.b. Cleveland	1.95c	
F.o.b. Youngstown	1.95c	
F.o.b. Buffalo	1.95c	
F.o.b. Birmingham	1.95c	
F.o.b. cars dock Gulf ports	2.30c	
F.o.b. cars dock Pacific ports	2.30c	

Iron		
F.o.b. Chicago	1.80c	
F.o.b. Terre Haute, Ind.	1.75c	
F.o.b. Louisville, Ky.	2.10c	
F.o.b. Danville, Pa.	1.80c	
F.o.b. Berwick, Pa.	1.80c	

## Cold Finished Bars and Shafting\*

	Base per Lb.
F.o.b. Pittsburgh	2.10c
F.o.b. Chicago	2.15c
F.o.b. Gary	2.15c
F.o.b. Cleveland	2.15c
F.o.b. Buffalo	2.20c
F.o.b. Detroit	2.30c
F.o.b. eastern Michigan	2.35c

\* In quantities of 10,000 to 19,000 lb.

## Fence and Sign Posts

	Base per Net Ton
F.o.b. Pittsburgh	\$30.00
F.o.b. Chicago	\$30.00
F.o.b. Duluth	\$1.00
F.o.b. Cleveland	\$5.00
F.o.b. Birmingham	\$3.00
F.o.b. Houston	\$9.00
F.o.b. cars dock Pacific ports	\$8.00

## Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c
F.o.b. Chicago	1.85c
F.o.b. Gary	1.85c
F.o.b. Cleveland	1.95c
F.o.b. Coatesville	1.90c
F.o.b. Sparrows Point	1.90c
F.o.b. Philadelphia	1.95c
F.o.b. New York	2.08c
F.o.b. Birmingham	1.95c
F.o.b. cars dock Gulf ports	2.20c
F.o.b. cars dock Pacific ports	2.35c
Wrought iron plates, f.o.b. P'gh.	3.00c

## Floor Plates

F.o.b. Pittsburgh	3.35c
F.o.b. Chicago	3.40c
F.o.b. Coatesville	3.40c
F.o.b. cars dock Gulf ports	3.75c
F.o.b. cars dock Pacific ports	3.90c

## Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c
F.o.b. Chicago	1.85c
F.o.b. Cleveland	1.95c
F.o.b. Buffalo	1.90c
F.o.b. Bethlehem	1.90c
F.o.b. Philadelphia	2.05c
F.o.b. New York	2.05c
F.o.b. Birmingham	2.05c
F.o.b. cars dock Gulf ports	2.25c
F.o.b. cars dock Pacific ports	2.35c

## Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c
F.o.b. Chicago	2.25c
F.o.b. Buffalo	2.25c
F.o.b. cars dock Gulf ports	2.60c
F.o.b. cars dock Pacific ports	2.60c

## SHEETS, STRIP, TIN PLATE

### TERNE PLATE

#### Sheets

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c
No. 10, f.o.b. Gary	1.95c
No. 10, del'd Detroit	2.05c
No. 10, del'd Phila.	2.14c
No. 10, f.o.b. Birmingham	2.00c
No. 10, f.o.b. dock cars Pacific ports	2.40c

#### Hot Rolled

	Base per Lb.
No. 24, f.o.b. Pittsburgh	2.40c
No. 24, f.o.b. Gary	2.50c
No. 24, del'd Detroit	2.60c
No. 24, del'd Phila.	2.69c
No. 24, f.o.b. Birmingham	2.55c
No. 24, f.o.b. dock cars Pacific ports	3.05c
No. 24, wrought iron, Pittsburgh	4.30c

#### Hot-Rolled Annealed

	Base per Lb.
No. 24, f.o.b. Pittsburgh	2.40c
No. 24, f.o.b. Gary	2.50c
No. 24, del'd Detroit	2.60c
No. 24, del'd Phila.	2.79c
No. 24, f.o.b. Birmingham	2.55c
No. 24, f.o.b. dock cars Pacific ports	3.10c

#### Heavy Cold-Rolled

	Base per Lb.
No. 10 gage, f.o.b. Pittsburgh	2.50c
No. 20 gage, f.o.b. Gary	3.05c
No. 10 gage, del'd Detroit	2.79c
No. 10 gage, del'd Phila.	2.79c
No. 10 gage, f.o.b. Birmingham	2.55c
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c

#### Light Cold-Rolled

	Base per Lb.
No. 20 gage, f.o.b. Pittsburgh	2.95c
No. 20 gage, f.o.b. Gary	3.15c
No. 20 gage, del'd Detroit	3.24c
No. 20 gage, f.o.b. Birmingham	3.10c
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c

#### Galvanized Sheets

	Base per Lb.
No. 24, f.o.b. Pittsburgh	3.10c
No. 24, f.o.b. Gary	3.20c
No. 24, del'd Phila.	3.39c
No. 24, f.o.b. Birmingham	3.25c
No. 24, f.o.b. dock cars Pacific ports	3.70c
No. 24, wrought iron, Pittsburgh	4.95c

#### Long Ternes

No. 24, unassorted 8-lb. coating	3.40c
F.o.b. cars dock Pacific ports	4.10c

#### Vitreous Enamel Stock

No. 20, f.o.b. Pittsburgh	3.10c
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#### Tin Mill Black Plate

	Base per Lb.
No. 28, f.o.b. Pittsburgh	2.75c
No. 28, Gary	2.85c
No. 28, cars dock Pacific Coast	3.35c

#### Tin Plate Base per Box

Standard cokes, f.o.b. P'gh district mill	\$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

#### Terne Plate

	(Per Package, 20 x 28 in.)
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

#### Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

	Base per Lb.
All widths up to 24 in. P'gh.	1.85c
All widths up to 24 in. Chicago	1.95c
All widths up to 24 in. del'd Detroit	2.05c
All widths up to 24 in. Birmingham	2.00c
Cooperage stock, Pittsburgh	2.10c
Cooperage stock, Chicago	2.20c

#### Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.60c
F.o.b. Cleveland	2.60c
F.o.b. Chicago	2.85c
F.o.b. Worcester	2.80c

#### Fender Stock

No. 16 and heavier, Pittsburgh or Cleveland	3.15c
F.o.b. Worcester	3.55c
No. 17 and lighter, Pittsburgh or Cleveland	3.30c
F.o.b. Worcester	3.70c

#### Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c
F.o.b. Chicago	1.75c
F.o.b. Birmingham	1.85c

## WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)  
To Manufacturing Trade Per Lb.  
Bright wire ..... 2.30c  
Spring wire ..... 3.20c  
Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland.

### To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per 100 Lb.
Standard wire nails	\$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10
Annealed fence wire	\$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	65.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

On manufacturers' wire prices at Pacific ports are \$5 above the Pittsburgh base. On high-carbon spring wire, prices at Pacific ports are also \$5 above Pittsburgh. On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi are \$6 a ton over Pittsburgh, while New Orleans and Pacific Coast prices are \$8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are \$11 a ton above Pittsburgh.

## Wire Hoops, Twisted or Welded

	Base per Net Ton
F.o.b. Pittsburgh	\$63.00
F.o.b. Chicago	64.00
F.o.b. Duluth	65.00
F.o.b. Cleveland	65.00
F.o.b. Birmingham	66.00
F.o.b. cars dock Houston, Galveston, Beaumont, Orange or Corpus Christi, Tex.	72.00
F.o.b. cars dock Pacific ports	74.00

## Bale Ties, Single Loop

	Base per Net Ton
F.o.b. Pittsburgh	\$63.00
F.o.b. Chicago	64.00
F.o.b. Duluth	65.00
F.o.b. Cleveland	65.00
F.o.b. Birmingham	66.00
F.o.b. cars dock Houston, Galveston, Beaumont, Orange or Corpus Christi, Tex.	72.00
F.o.b. cars dock Pacific ports	74.00

## STEEL AND WROUGHT PIPE AND TUBING

### Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills  
F.o.b. Pittsburgh only on wrought iron pipe.

### Butt Weld

Inches	Steel	Wrought Iron
1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
3/4	Black Galv. 51% 29%	Black Galv. 51% 29%
1	Black Galv. 51% 29%	Black Galv. 51% 29%
1 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
2	Black Galv. 51% 29%	Black Galv. 51% 29%
2 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
3	Black Galv. 51% 29%	Black Galv. 51% 29%
3 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
4	Black Galv. 51% 29%	Black Galv. 51% 29%
4 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
5	Black Galv. 51% 29%	Black Galv. 51% 29%
5 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
6	Black Galv. 51% 29%	Black Galv. 51% 29%
6 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
7	Black Galv. 51% 29%	Black Galv. 51% 29%
7 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
8	Black Galv. 51% 29%	Black Galv. 51% 29%
8 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
9	Black Galv. 51% 29%	Black Galv. 51% 29%
9 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
10	Black Galv. 51% 29%	Black Galv. 51% 29%
10 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
11	Black Galv. 51% 29%	Black Galv. 51% 29%
11 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
12	Black Galv. 51% 29%	Black Galv. 51% 29%
12 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
13	Black Galv. 51% 29%	Black Galv. 51% 29%
13 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
14	Black Galv. 51% 29%	Black Galv. 51% 29%
14 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
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15 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
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16 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
17	Black Galv. 51% 29%	Black Galv. 51% 29%
17 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
18	Black Galv. 51% 29%	Black Galv. 51% 29%
18 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
19	Black Galv. 51% 29%	Black Galv. 51% 29%
19 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
20	Black Galv. 51% 29%	Black Galv. 51% 29%
20 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
21	Black Galv. 51% 29%	Black Galv. 51% 29%
21 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
22	Black Galv. 51% 29%	Black Galv. 51% 29%
22 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
23	Black Galv. 51% 29%	Black Galv. 51% 29%
23 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
24	Black Galv. 51% 29%	Black Galv. 51% 29%
24 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
25	Black Galv. 51% 29%	Black Galv. 51% 29%
25 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
26	Black Galv. 51% 29%	Black Galv. 51% 29%
26 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
27	Black Galv. 51% 29%	Black Galv. 51% 29%
27 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
28	Black Galv. 51% 29%	Black Galv. 51% 29%
28 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
29	Black Galv. 51% 29%	Black Galv. 51% 29%
29 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
30	Black Galv. 51% 29%	Black Galv. 51% 29%
30 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
31	Black Galv. 51% 29%	Black Galv. 51% 29%
31 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
32	Black Galv. 51% 29%	Black Galv. 51% 29%
32 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
33	Black Galv. 51% 29%	Black Galv. 51% 29%
33 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
34	Black Galv. 51% 29%	Black Galv. 51% 29%
34 1/2	Black Galv. 51% 29%	Black Galv. 51% 29%
35	Black Galv. 51% 29%	



## BOLTS, NUTS, RIVETS AND SET SCREWS

### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine bolts	Per Cent Off List
70, 10 and 10	70, 10 and 10
Carriage bolts	70, 10 and 10
Lag bolts	70, 10 and 10
Flange bolts, Nos. 1, 2, 3 and 7	70, 10 and 10
Hot-pressed nuts, blank or tapped, square	70, 10 and 10
Hexagons	70, 10 and 10
C.P.C. and T. square or hex. nuts, blank or tapped	70, 10 and 10
Semi-finished hexagon nuts U.S.S. all sizes	70, 10 and 10
Semi-finished hexagon nuts, S.A.E. 1/2 in. to 1 1/16 in. diameter	75 and 10
1/2 in. to 1 in. diameter	75
larger than 1 in. diameter	70
Store bolts in packages, Pittsburgh	75
Store bolts in packages, Chicago	75
Store bolts in packages, Cleveland	75
Store bolts in bulk, F.P.G.	83
Store bolts in bulk, Chicago	83
Store bolts in bulk, Cleveland	83
Tire bolts	60 and 10

### Large Rivets

(1/2-in. and larger)

F.o.b. Pittsburgh or Cleveland	Base per 100 Lb.
.....	\$2.90
F.o.b. Chicago	Base per 100 Lb.
.....	3.00
F.o.b. Birmingham	Base per 100 Lb.
.....	3.05

### Small Rivets

(7/16-in. and smaller)

F.o.b. Pittsburgh	Per Cent Off List
70 and 5	70 and 5
F.o.b. Cleveland	Per Cent Off List
70 and 5	70 and 5
F.o.b. Chicago and Birm'g'm	Per Cent Off List
70 and 5	70 and 5

### Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Milled cap screws, 1 in. dia. and smaller	Per Cent Off List
75, 10 and 10	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread 1/2 in. and smaller	75
Upset hex. head cap screws, U.S.S. S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws, cut and oval point	75 and 10
Milled studs	65

## Alloy and Stainless Steel

### Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem	Uncropped
.....	\$40 per gross ton

### Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem	Base price, \$49 a gross ton
.....	Price del'd Detroit is \$52.

### Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	Open-hearth grade, base
.....	2.45c.
Delivered price at Detroit	2.60c.
S.A.E. Alloy Differential	per 100 lb.
Series	
Numbers	
2000 (1/4% Nickel)	\$0.25
2100 (3/4% Nickel)	0.35
2300 (3/4% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.25 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.50
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 30c. higher. The differential for cold-drawn bars is 1/2c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

### Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base per lb.

### STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C)

(Base Prices, F.o.b. Pittsburgh)	Per Lb.
Bars	23c.
Plates	26c.
Sheets	25c.
Hot-rolled strip	26c.
Cold-rolled strip	27c.

## Raw and Semi-Finished Steel

### Carbon Steel Re-rolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Uncropped .....\$29 per gross ton

### Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Uncropped .....\$31 per gross ton

### Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Per Gross Ton

Re-rolling	Delivered Detroit
Forging quality	\$37.00
Re-rolling	\$30.00
Forging	\$35.00

### Billets Only F.o.b. Duluth

Re-rolling	Base per 100 Lb.
Forging	\$29.00
Forging	\$4.00

### Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md. Per Gross Ton

Open-hearth or Bessemer	Base per 100 Lb.
.....	\$28.00

### Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md. Per Lb.

Grooved	Universal	Sheared
.....	.....	.....

### Tube Rounds

Base per Lb.

F.o.b. Pittsburgh	F.o.b. Chicago	F.o.b. Cleveland	F.o.b. Buffalo	F.o.b. Birmingham
.....	.....	.....	.....	.....

### Wire Rods

(Common soft, base)

F.o.b. Pittsburgh	F.o.b. Cleveland	F.o.b. Chicago	F.o.b. Anderson, Ind.	F.o.b. Youngstown	F.o.b. Worcester, Mass.	F.o.b. Birmingham	F.o.b. San Francisco
.....	.....	.....	.....	.....	.....	.....	.....

## Pig Iron and Ferroalloys

### PIG IRON

#### PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$19.50	\$20.00	\$19.00	\$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	20.00	19.00	20.50
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	18.50	18.00	19.00
Erie, Pa.	18.50	18.50	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.25
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	19.00
Duluth, Minn.	19.00	19.00	18.50	19.50
Birmingham	14.50	14.50	13.50	14.00
Provo, Utah	17.50	17.50	17.00	17.50

#### DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	\$20.00	\$20.50	\$19.50	\$21.00
Brooklyn				
From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J.	20.89	21.39	20.39	21.89
Philadelphia	20.28	20.78	19.78	21.28
From Eastern Pa.	20.28	20.78	19.78	21.28
Cincinnati	19.51	19.51	19.01	20.01
From Hamilton, Ohio	19.76	19.76	19.26	20.26
Canton, Ohio	19.76	19.76	19.26	20.26
From Cleveland and Youngstown	20.50	20.50	19.50	21.00
Columbus, Ohio	20.50	20.50	19.50	21.00
From Hamilton, Ohio	20.26	20.26	19.26	20.26
Mansfield, Ohio	20.26	20.26	19.26	20.26
From Cleveland and Toledo	20.77	20.77	19.77	20.77
Indianapolis	20.55	20.55	19.55	20.55
From Hamilton, Ohio	20.77	20.77	19.77	20.77
South Bend, Ind.	20.55	20.55	19.55	20.55
From Chicago	19.50	19.50	18.50	19.50
Milwaukee	20.94	20.94	19.94	20.94
From Chicago	20.26	20.26	19.26	20.26
Davenport, Iowa	21.04	21.04	20.04	21.04
From Granite City	21.04	21.04	20.04	21.04

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

### LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	Base per 100 Lb.
.....	\$23.50
Johnson City, Tenn.	23.50
Del'd Chicago	29.15
Johnson City, Tenn. (off grade)	19.50

### GRAY FORCE PIG IRON

Valley furnace .....\$18.35

### CHARCOAL PIG IRON

Lake Superior furnace	Delivered Chicago	Delivered Buffalo
.....	\$21.00	24.04
Delivered Buffalo	24.28	

## CANADA

### Pig Iron

Per gross ton:

#### Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	Base
.....	\$21.00
No. 2 fdy., sil. 1.75 to 2.25	Base
.....	20.50
Malleable	21.00

#### Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	Base
.....	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	Base
.....	22.00
Malleable	22.50
Basic	22.00

## FERROALLOYS

### Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Domestic, 80% (carload)	Per Gross Ton
.....	\$45.00

### Spiegelstein

Domestic, 19 to 21%	Per Gross Ton
.....	\$26.00

### Electric Ferroalloy

50% (carloads)	Per Gross Ton Delivered
.....	\$77.50
50% (ton lots)	Per Gross Ton
.....	85.00
75% (carloads)	Per Gross Ton
.....	126.00
75% (ton lots)	Per Gross Ton
.....	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	Per Gross Ton
.....	31.00
14% to 16% (less carloads)	Per Gross Ton
.....	35.50

### Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6% .....\$22.75	12% .....\$29.25
7% .....23.75	13% .....30.75
8% .....24.75	14% .....32.25
9% .....25.75	15% .....33.75
10% .....26.75	16% .....35.25
11% .....27.75	17% .....36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

### Bessemer Ferroalloy

F.o.b. Jackson, Ohio, Furnace			
	Per Gross Ton		Per Gross Ton
10%	.....\$27.75	14%	.....\$33.25
11%	.....28.75	15%	.....34.75
12%	.....30.25	16%	.....36.25
13%	.....31.75	17%	.....37.75

Manganese 1 1/2 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 ton additional. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

### Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads .....\$1.35 to \$1.45
Ferrotungsten, less carloads, 1.45 to 1.55
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered in carloads .....10.00c.
Ferrocromium, 2% carbon .....2.50c. to 17.00c.
Ferrocromium, 1% carbon .....17.50c. to 18.00c.
Ferrocromium, 0.10% carbon .....19.50c. to 20.00c.
Ferrocromium, 0.06% carbon .....20.00c. to 20.50c.
Ferrovandium, del., per lb. contained V .....\$2.70 to \$2.90
Ferrocobaltitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton .....\$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18% Rockdale, Tenn., base, per gross ton with \$2 unitage .....50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage .....45.00
Ferromolybdenum, per lb. Mo., del. .....85c.
Calcium molybdate, per lb. Mo., del. .....80c.
Silico spiegel, per ton, f.o.b. furnace, car lots .....138.00
Ton lots or less, per ton .....45.50
Silico-manganese, gross ton, delivered .....250c. carbon grade .....90.00
2% carbon grade .....95.00
1% carbon grade .....105.00
Spot prices .....\$5 a ton higher

# Iron and Steel Scrap

## PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$10.50 to \$11.00
No. 2 heavy melting steel	9.50 to 10.00
No. 3 railroad wrought	10.50 to 11.00
Scrap rails	10.50 to 11.00
Rails 3 ft. and under	13.50 to 14.00
Compressed sheet steel	10.25 to 10.75
Hand bundled sheet steel	9.25 to 9.75
Hvy. steel axle turnings	9.25 to 9.75
Machine shop turnings	7.00 to 7.50
Short shov. turnings	7.00 to 7.50
Short mixed borings and turnings	6.50 to 7.00
Cast iron borings	6.50 to 7.00
Cast iron car wheels	11.00 to 11.50
Heavy breakable cast	10.00 to 10.50
No. 1 cast	11.50 to 12.00
Rail knuckles and couplers	13.50 to 14.00
Rail, coil and leaf springs	13.50 to 14.00
Roller steel wheels	13.50 to 14.00
Low phos. billet crops	13.50 to 14.00
Low phos. sheet bar crops	12.50 to 13.00
Low phos. plate scrap	12.50 to 13.00
Low phos. punchings	13.00 to 13.50
Steel car axles	13.50 to 14.00

## CHICAGO

### Delivered Chicago district consumers:

Per Gross Ton	
Heavy melting steel	\$8.00 to \$8.50
Automobile hvy. melt. steel	7.50 to 8.00
Shoveling steel	8.00 to 8.50
Hydraulic comp. sheets	7.00 to 7.50
Drop forge flashings	6.50 to 7.00
No. 1 busheling	6.50 to 7.00
Machine shop turnings	4.00 to 4.50
Roller car wheels	10.00 to 10.50
Railroad tires	10.00 to 10.50
Railroad leaf springs	10.00 to 10.50
Steel couplers and knuckles	9.00 to 9.50
Steel couplers and knuckles	9.25 to 9.75
Coil springs	10.50 to 11.00
Steel turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	10.00 to 10.50
Low phos. plates, 12 in. and under	10.00 to 10.50
Cast iron borings	4.50 to 5.00
Short shoveling turnings	4.50 to 5.00
Machine shop turnings	4.25 to 4.75
Rolling rails	10.00 to 10.50
Steel rails, less than 3 ft.	10.00 to 10.50
Steel rails, less than 2 ft.	10.50 to 11.00
Angle bars, steel	9.50 to 10.00
Cast iron car wheels	9.50 to 10.00
Railroad malleable	8.50 to 9.00
Agricultural malleable	7.75 to 8.25

### Per Net Ton

Iron car axles	\$12.00 to \$12.50
Steel car axles	10.00 to 10.50
No. 1 railroad wrought	6.75 to 7.25
No. 2 railroad wrought	7.25 to 7.75
No. 2 busheling	3.50 to 4.00
Locomotive tires, smooth	9.00 to 9.50
Pipe and flange	4.50 to 5.00
No. 2 machinery cast	8.00 to 8.50
Clean automobile cast	8.00 to 8.50
No. 1 railroad cast	7.50 to 8.00
No. 1 agricultural cast	7.00 to 7.50
Stove plate	5.25 to 5.75
Grate bars	4.75 to 5.25
Brake shoes	6.00 to 6.50

## PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.25 to \$9.75
No. 2 heavy melting steel	\$8.00 to 8.50
No. 1 railroad wrought	\$11.00 to 11.50
Bundled sheets	9.00
Hydraulic compressed, new	9.50
Hydraulic, compressed, old	6.50 to 7.00
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Heavy breakable cast	9.50 to 10.00
Stove plate (steel works)	8.00
No. 1 low phos. heavy	14.00 to 14.50
Couplers and knuckles	13.50 to 14.00
Roller steel wheels	13.50 to 14.00
No. 1 blast furnace	5.00 to 5.50
Spec. iron and steel pipe	8.00
Shafting	15.00 to 16.00
Steel axles	14.50
No. 1 forge fire	9.00
Cast iron car wheels	11.00 to 11.50
No. 1 cast	11.50 to 12.00
Cast borings (chem.)	12.00 to 12.50
Steel rails for rolling	12.00

## CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$6.75 to \$7.25
Scrap rails for melting	8.00 to 8.50
Lower sheet clippings	3.50 to 4.00
Bundled sheets	5.50 to 6.00
Cast iron borings	4.50 to 5.00
Machine shop turnings	4.00 to 4.50
No. 1 busheling	5.50 to 6.00
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.50 to 9.00
No. 1 locomotive tires	8.25 to 8.75
Short rails	11.00 to 11.50
Cast iron car wheels	7.50 to 8.00
No. 1 machinery cast	8.75 to 9.25
No. 1 railroad cast	8.25 to 8.75
Burnt cast	5.75 to 6.25
Stove plate	5.75 to 6.25
Agricultural malleable	7.75 to 8.25
Railroad malleable	7.75 to 8.25

## CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$8.00 to \$8.50
No. 2 heavy melting steel	7.50 to 8.00
Compressed sheet steel	7.25 to 7.75
Light bundled sheet stamp	
ings	6.50 to 7.00
Drop forge flashings	7.00 to 7.50
Machine shop turnings	6.00 to 6.50
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	7.00 to 7.50
Steel iron turnings	7.00 to 7.50
Low phos. billet crops	12.50 to 13.00
Cast iron borings	6.25 to 6.75
Mixed borings and short turnings	6.25 to 6.75
No. 2 busheling	6.25 to 6.75
No. 1 cast	10.50 to 11.00
Railroad grate bars	7.00 to 7.50
Stove plate	6.50 to 7.00
Rails under 3 ft.	12.50 to 13.00
Rails for rolling	15.50 to 16.00
Railroad malleable	11.50 to 12.00
Cast iron car wheels	9.75 to 10.00

## BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$9.50 to \$10.50
No. 2 heavy melting scrap	8.50 to 9.00
Scrap rails	9.50 to 10.00
New hydraulic comp. sheets	8.50 to 9.00
Old hydraulic comp. sheets	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.50 to 9.00
Hvy. steel axle turnings	6.50 to 7.00
Machine shop turnings	4.00 to 4.50
Knuckles and couplers	11.00 to 11.50
Coil and leaf springs	11.00 to 11.50
Roller steel wheels	11.00 to 11.50
Low phos. billet crops	11.50 to 12.00
Short shov. steel turnings	5.50 to 6.00
Short mixed borings and turnings	5.50 to 6.00
Cast iron borings	5.50 to 6.00
No. 2 busheling	5.00 to 5.50
Steel car axles	10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 machinery cast	10.00 to 10.50
No. 1 cupola cast	9.00 to 9.50
Stove plate	11.00 to 11.50
Steel rails, less than 2 ft.	12.00 to 12.50
Cast iron car wheels	10.00 to 10.50
Industrial malleable	10.00 to 10.50
Railroad malleable	10.00 to 10.50
Chemical borings	7.00 to 7.50

## BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$8.50 to \$9.00
Scrap T rails	5.50 to 6.00
No. 2 steel	5.00 to 5.25
Breakable cast	6.00 to 6.50
Machine shop turnings	1.00 to 1.25
Bundled skeleton, long	3.30 to 3.50
Forge flashings	4.25 to 4.50
Blast furnace scrap	10.00 to 10.50
Shafting	11.00 to 11.25
Steel car axles	10.50 to 11.00
Cast iron borings, chemical	7.00 to 7.50
Stove plate	6.50
Per gross ton delivered consumers' yards:	
Textile cast	\$7.50 to \$8.00
No. 1 machinery cast	7.50 to 9.00
Railroad malleable	11.00 to 11.50

## NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$7.00 to \$8.00
No. 2 heavy melting steel	\$5.50 to \$6.50
Heavy breakable cast	6.00 to 6.50
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	6.25 to 6.75
Stove plate	5.00 to 5.50
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	7.50 to 8.50
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	3.00 to 4.00
Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$10.25
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	8.00

\*For direct car loading only.  
†Loading on barge.

## BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$8.50
Scrap steel rails	9.00
Short shoveling turnings	5.50
Stove plates	6.50
Steel axles	\$10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 railroad wrought	5.50
Rails for rolling	10.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	8.00

## ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$8.75 to \$9.25
No. 1 heavy melting	7.00 to 7.50
No. 2 heavy melting	6.50 to 7.00
No. 1 locomotive tire	9.50 to 10.00
Misc. stand-sec. rails	8.75 to 9.25
Railroad springs	9.00 to 9.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	8.00 to 8.50
Cast iron borings and shoveling turnings	2.50 to 3.00
Rails for rolling	9.75 to 10.25
Machine shop turnings	2.50 to 3.00
Heavy turnings	5.50 to 6.00
Steel car axles	10.50 to 11.00
Iron car axles	12.50 to 13.00
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars	9.00 to 9.50
Cast iron car wheels	7.50 to 8.00
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	8.50 to 9.00
No. 1 railroad cast	8.50 to 9.00
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

## DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$6.75 to \$7.25
Borings and short turnings	4.75 to 5.25

## ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

### Lake Superior Ores

#### Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.5% iron	\$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

### Foreign Ore

#### C.A.F. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	9.50c.
Iron, low phos., Swedish, average 68% iron	9.50c.
Iron, basic or foundry, Swedish, average, 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	31c.
Manganese, African, Indian, 49-51%	34c.
Manganese, Brazilian, 46 to 48%	30c.

#### Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered*	\$17.50 to \$18.50
Tungsten, domestic scheelite, delivered†	17.00

#### Per Gross Ton

Chrome, 45%, Cr <sub>2</sub> O <sub>3</sub> , crude, c.i.f. Atlantic Seaboard	\$17.00
Chrome, 48% Cr <sub>2</sub> O <sub>3</sub> , c.i.f. Atlantic Seaboard	20.00

\*Quotations nominal in absence of sales.  
†Nominal; no supplies available.

### Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	\$15.50 to \$16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	\$15.50 to 16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2% silicon, f.o.b. Illinois and Kentucky mines	30.00

## COKE, COAL AND FUEL OIL

### Coke

Per Net Ton	
Furnace, f.o.b. Connellsville	\$5.85
Prompt	
Foundry, f.o.b. Connellsville	\$4.60 to 5.10
Prompt	
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.35
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.30 to 8.81
Foundry, by-product, Phila.	9.00

Long turnings	\$3.75 to \$4.25
No. 1 machinery cast	8.00 to 8.50
Automotive cast	9.75 to 10.25
Hydraulic comp. sheets	6.75 to 7.25
Stove plate	6.25 to 6.75
New factory busheling	5.75 to 6.25
Old No. 2 busheling	4.00 to 4.50
Sheet clippings	3.00 to 3.50
Flashings	5.50 to 6.00
Low phos. plate scrap	7.00 to 7.50

## CANADA

### Dealers' buying prices per gross ton:

Toronto Montreal	
Heavy melting steel	\$5.50 \$5.50
Rails scrap	4.00 4.00
Machine shop turnings	2.50 2.50
Boiler plate	4.50 4.50
Heavy axle turnings	2.50 2.50
Cast borings	3.00 3.00
Steel borings	2.00 2.00
Wrought pipe	2.50 2.50
Steel axles	4.50 4.50
Axles wrought iron	4.50 4.50
No. 1 machinery cast	7.75 8.00
Stove plate	4.50 4.50
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Foundry, by-product, Cleveland, delivered	\$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.50
Foundry, by-product, del'd St. Louis	9.00

### Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	\$1.80 to \$2.90
Mine run coking coal f.o.b. W. Pa. mines	2.05 to 2.25
Gas coal, 1/4-in. f.o.b. Pa. mines	2.25 to 2.50
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.40
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.60
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

### Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.80c.
No. 5 industrial fuel oil	3.50c.

Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.50c.

## REFRACTORIES

### Fire Clay Brick

Per 1000 f.o.b. Works	
High-heat Intermediate Duty Brick	Duty Brick
Pennsylvania	\$45.00
Maryland	45.00
New Jersey	55.00
Ohio	45.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay, per ton	7.00

### Chrome Brick

Per Net Ton	
Standard size	\$45.00

### Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	\$45.00
Chicago	55.00
Birmingham	55.00
Silica clay, per ton	8.00

### Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa. ....	\$45.00
Unburned, f.o.b. Baltimore .....	55.00
Imported grain magnesite, f.o.b. Baltimore and Chester, Pa. ....	45.00
Domestic grain magnesite, f.o.b. Baltimore and Chester, Pa. ....	40.00
Domestic, f.o.b. Chewelah, Wash. ....	22.00



# Warehouse Prices for Steel Products

## PITTSBURGH

	Base per Lb.
Plates, 1/4 in. and heavier	3.15c
Structural shapes	3.15c
Soft steel bars and small shapes	2.90c
Reinforcing steel bars	2.90c
Cold-finished and screw stock	3.45c
Rounds and hexagons	3.45c
Squares and flats	3.20c
Hoops and bands under 1/4 in.	3.30c
Hot-rolled annealed sheets (No. 24)	3.95c
25 or more bundles	3.30c
Galv. sheets (No. 24), 25 or more	3.95c
Hot-rolled sheets (No. 10)	2.95c
Hot-rolled strips	2.95c
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	\$3.60
Spikes, large	2.90c
Track bolts, all sizes, per 100 count	65 per cent off list
Machine bolts, 100 count	65 per cent off list
Carriage bolts, 100 count	65 per cent off list
Nuts, all styles, 100 count	65 per cent off list
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'd, base per 100 lb.	\$3.70c
Wire, galv. soft, base per 100 lb.	\$3.95c
Common wire nails, per keg	\$2.85c
Cement coated nails, per keg	\$3.85c

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to \$999 lb.  
\*Delivered in Pittsburgh switching district.

## CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c
Soft steel bars	2.95c
Cold-fn. steel bars and shafting	3.50c
Rounds and hexagons	3.50c
Flats and squares	3.50c
Hot-rolled strip	3.30c
Hot-rolled annealed sheets (No. 24)	3.85c
Galv. sheets (No. 24)	4.55c
Hot-rolled sheets (No. 10)	3.55c
Spikes (9/16 in. and lighter)	3.50c
Track bolts	4.65c
Rivets, structural (keg lots)	3.50c
Rivets, boiler (keg lots)	3.60c
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap. or blank	60 and 5
Hex. head and cap screws	80
Cap point set screws	70 and 10
Flat head bright wood screws, 3/4 and 10	50
Spring cotter pins	50
Store bolts in full packages, 7/8 and 10	50
Rd. hd. tank rivets, 7/16 in. and smaller	57 1/2
Wrought washers	\$4.50 off list
No. 8 black ann'd wire per 100 lb.	\$3.85
Com. wire nails, base per keg	3.05c
Cement c'd nails, base per keg	3.05c

## NEW YORK

	Base per Lb.
Plates, 1/4 in. and heavier	3.40c
Structural shapes	3.37c
Soft steel bars, small shapes	3.25c
Iron bars	3.25c
Iron bars, swed. charcoal	6.50 to 7.25c
Cold-fn. shafting and screw stock	3.95c
Rounds and hexagons	3.95c
Flats and squares	4.42c
Cold-roll. strip, soft and quarter hard	3.32c
Hoops	3.52c
Bands	3.52c
Hot-rolled sheets (No. 10)	3.27c
Hot-rolled ann'd sheets (No. 24)	3.85c
Galvanized sheets (No. 24)	4.50c
Long term sheets (No. 24)	5.20c
Standard tool steel	11.00c
Wire, black annealed (No. 10)	3.25c
Wire, galv. (No. 10)	3.85c
Tire steel, 1 x 1/4 in. and larger	3.65c
Open hearth spring steel	4.00c to 10.00c
Common wire nails, base, per keg	\$3.21
	Per Cent
Machine bolts, cut thread:	Off List
Up to 1 in. dia. inclusive	60
Over 1 in. dia.	50
Carriage bolts, cut thread:	Off List
Up to 1/2 in. dia. inclusive	60
Over 1/2 in. dia.	50
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.34
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	68.65

\*No. 28 and lighter, 36 in. wide, 30c. higher per 100 lb.

## ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.44c
Bars, soft steel or iron	3.19c
Cold-fn. rounds, shafting, screw stock	3.74c
Hot-rolled annealed sheets (No. 24)	4.09c
Galv. sheets (No. 24)	4.79c
Hot-rolled sheets (No. 10)	3.29c
Black corrug. sheets (No. 24)	4.09c
*Galv. corrug. sheets	4.79c
Structural rivets	3.90c
Boiler rivets	4.00c
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	1000 lb. or over
1000 lb. or over	60 and 5
200 to 999 lb.	60
100 to 199 lb.	55
Less than 100 lb.	50

\*No. 26 and lighter take special prices.

## PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	2.95c
*Structural shapes	2.95c
*Soft steel bars, small shapes, iron bars (except bands)	2.90c
*Reinforce. steel bars, sq. twisted and deformed	2.955c
Cold-finished steel bars	2.75c
*Steel hoops	3.40c
*Steel bands, No. 12 and 3/16 in. incl.	3.15c
Spring steel	5.00c
*Hot-rolled anneal. sheets (No. 24)	3.55c
*Galvanized sheets (No. 24)	4.25c
*Hot-rolled annealed sheets (No. 10)	3.05c
Diam. pat. floor plates, 1/4 in.	4.95c
Swedish iron bars	6.25c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.  
\*Base prices subject to deduction on orders aggregating 4000 lb. or over.  
†For 50 bundles or over.  
‡For less than 2000 lb.

## CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c
Soft steel bars	2.95c
Reinforce. steel bars	2.10c
Cold-finished steel bars	3.40c
Flat-rolled steel under 1/4 in.	3.35c
4-in. finished strip	3.60c
Hot-rolled annealed sheets (No. 24)	3.95c
Galvanized sheets (No. 24)	4.61c
Hot-rolled sheets (No. 10)	3.11c
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c
Black ann'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

\*Plus mill. size and quantity extras.  
†Outside delivery 10c. less.

## CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.40c
Bars, soft steel or iron	3.15c
New billet reinforce. bars	3.25c
Rail steel reinforce. bars	3.25c
Hoops and bands, 3/16 in. and lighter	3.45c
Cold-finished bars	3.70c
Hot-rolled annealed sheets (No. 24)	4.00c
Galv. sheets (No. 24)	4.70c
Hot-rolled sheets (No. 10)	3.20c
Structural rivets	4.35c
Small rivets	55 per cent off list
No. 9 ann'd wire, per 100 lb. (1000 lb. or over)	\$2.91
Com. wire nails, base per keg (1 25 to 50 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	\$10.03
4-in.	14.95
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

## BUFFALO

	Base per Lb.
Plates	3.37a
Struc. shapes	3.25c
Soft steel bars	3.00a
Reinforcing bars	2.60c
Cold-fn. flats and sq.	3.55c
Round and hex.	3.55c
Cold-rolled strip steel	3.39c
Hot-rolled annealed sheets (No. 24)	4.95c
Heavy hot-rolled sheets, 3/16 in.	3.62c
24 to 48 in. wide	4.65c
Galv. sheets (No. 24)	3.42c
Bands	3.42c
Hoops	3.42c
Hot-rolled unannealed sheets	3.17c
Com. wire nails, base per keg	\$3.35
Black wire, base per 100 lb.	3.45c

## BOSTON

	Per Lb.
Beams, channels, angles, less, less	3.52c
H beams and shapes	3.52c
Plates—sheared, tank and univ. mill, 1/4 in. thick and heavier	3.52c
Floor plates, diamond pattern	3.53c
Bar and bar shapes (mild steel)	3.30c
Bands 3/16 in. thick and No. 12 ga. incl.	3.60c to 4.60c
Half rounds, half ovals, ovals and bevels	4.55c
Tire steel	4.55c
Cold-finished rounds and hexagons	5.25c
Cold-rolled strip steel	3.25c
Cold-finished squares and flats	5.75c
Blue annealed sheets, No. 10 gal.	3.60c
One pass cold-rolled sheets No. 24	4.15c
Galvanized steel sheets, No. 24 ga.	4.85c
Lead coated sheets, No. 24 ga.	5.80c

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.  
\*Base.

## PACIFIC COAST

	Base per Lib.
	San Fran. Los Angeles Seattle
Plates, tank and	3.55c 3.70c 3.55c
U. M.	3.55c 3.70c 3.55c
Shapes, standard	3.55c 3.70c 3.55c
Soft steel bars	3.60c 3.70c 3.55c
Reinforcing bars	3.50c 3.50c 3.50c
Hot-rolled annealed sheets (No. 24)	4.40c 4.45c 4.40c
Hot-rolled sheets (No. 10)	3.75c 3.80c 3.75c
Galv. sheets (No. 24)	5.00c 5.05c 5.00c
Cold-finished steel	5.95c 5.95c 4.75c
Rounds	5.95c 5.95c 4.75c
Squares	7.20c 7.20c 6.00c
Hexagons	7.20c 7.20c 6.00c
Flats	7.70c 7.70c 7.00c
Common wire nails	—base per keg
—base per keg	\$3.40 \$3.25 \$3.38
—less carload	—

All items subject to differentials for quantity.

## "Shelter Belt" Project Hits Financial Snag

WASHINGTON, Sept. 25.—Contemplated large wire fencing tonnage for the so-called shelter belt in the West has been pushed to the background by a ruling of Comptroller J. R. McCarl forbidding the use of more than \$1,000,000 for the project. It was stated recently that \$25,000,000 had been allocated for the undertaking and that purchase of the fencing was about to begin, 25,000 tons to be asked for in October. It was estimated that in all it would require 165,000 tons of fencing, an unprecedented requirement of the kind.

Some steel interests have declared the suggested tonnages would never be approached, even if the project actually is carried out. The tonnage mentioned came from Governmental

sources. The belief, however, especially in view of McCarl's ruling, is that work on the belt, if established, will extend over a much longer period than had been previously estimated by officials. Some had predicted it would be completed in five years. Now it is estimated by those who still think the huge project will be completed that it will require 15 years at least. Others think it is a fantastic undertaking and that the only thing that will be done will be to start on job, plant a few trees and let it go at that.

The actual allocation that had been made, the McCarl ruling revealed, was \$15,000,000, made by President Roosevelt in an executive order. The money was part of the \$525,000,000 drought relief appropriation. The ruling, it also was learned, was made several weeks ago, though reports that work on the project would proceed with the supposedly \$25,000,000 fund were given out just the same.

Mr. McCarl said that the drought

appropriation was for immediate relief and confined the shelter belt expenditure to \$1,000,000. He also objected to release of the full sum on the ground that the project would require more than the original allotment and that additional funds would have to be obtained from Congress. Further, he held that the emergency appropriation was not available for a drought preventive in the future.

Despite the ruling, however, F. A. Silcox, chief forester, Department of Agriculture, said he would go ahead with the project "just as if there were no change." He declared that the \$1,000,000 would provide for all requirements that would be needed up to next spring. Later, however, he modified his position to say that those in charge of the project, in which President Roosevelt has taken a personal and active interest, would ask for money from other appropriations or seek additional funds from Congress.

# Lead Five Points Down at 3.50c. a Lb.; Stocks Declined 6000 Tons in August

Spelter Sales Amount to 1500 Tons at Low 4c. a Lb. Level; Tin Only Slightly Active for Foward Positions—Copper Inactive

NEW YORK, Sept. 25.—Average daily sales of electrolytic copper are only slightly better than 100 tons, but more optimistic members of the trade expect improvement in activity toward the end of the month. Many consumers still have considerable metal undelivered on contracts which must be liquidated by October 1. The metal will of necessity be paid for by that time, but refineries are in many cases storing the copper for future delivery. As a result to this backlog and the generally poor operations of fabricators, it is doubtful whether the copper market will shake off its lethargy before November. The situation abroad likewise continues to be discouraging, with considerable amounts of metal offered for sale by American and Belgian producers and almost a negligible amount of consumer demand. The price this morning was

6.85c. a lb., c.i.f. usual Continental base ports, and there is a slight tendency toward firmness as the result of speculative activity which received its impetus in rumors of favorable developments.

## Tin

Importers are securing a few commitments, but consumer preference is decidedly for positions forward through December and into the first quarter. In addition, a number of users are asking for postponements of shipments on old contracts. This action comes as a surprise, as the belief was that consumer stocks were very low in view of the light purchasing of past months. Evidently the stock positions of tinning plants were considerably heavier than had been suspected. In London the prices on first call this morning show a big premium on spot metal, but the price

here does not show similar tightness. Such a condition follows from the avoidance of immediate delivery in this country. Prompt Straits was priced in New York today at 51.50c. a lb. The prices in London on first call were £232 10s. and £229 for spot and future standard respectively, and £230 2s. 6d. for Straits at Singapore.

## Zinc

As in the case of other metals the position of spelter continues weak and uncertain as a result of the poor operations of consuming industries. Most sellers are willing to make commitments into December at 4c. a lb., East St. Louis, but at present there is practically no metal available under 4c., as several distress lots offered last week have been withdrawn. Sales of Prime Western during the past week amounted to 1500 tons, mostly at 4c. for September delivery, as compared with 2000 tons in the preceding period, and 1500 tons booked in the seven-day period two weeks earlier. The present low price of refined metal is partially a result of weakness in the ore market, which is again suffering from excess production. Concentrates are now available in the Tri-State area at \$23 and \$24 a ton for flotation and prime grades respectively. Production last week continued high at 7900 tons, despite plans for curtailment.

## Lead

For the first time in over a year the statistical trend of this metal is toward a reduction of the surplus stocks which have been bearing unfavorably on the market. During August the stocks at refineries were cut a total of 6000 tons, mostly as the result of heavier shipments, which rose to 33,000 tons, and output was reduced to 27,000 tons. The curtailment in output came as a result of widespread restriction of smelting operations, whereas mine production is practically unaltered from previous months. Naturally the August statistics have encouraged sellers to a degree, but consumer reaction has been negligible. There is currently a moderate diversified demand at 3.65c. a lb., New York, and 3.50c., St. Louis, but significant purchasing is not expected to appear unless the price should show a firm tendency to advance.

## Ingot Brass and Bronze

The combined July deliveries of ingot brass and bronze made by members of the Non-Ferrous Ingot Metal Institute totaled 4317 tons. The average prices paid during the 28-day period ended September 7 by consumers of commercial 85-5-5 and commercial 80-10-10 brass ingots were 8.759c. and 10.271c. a lb. respectively. For an equal period one month previously these prices were 8.761c. and 10.377c. a lb. respectively.

### The Week's Prices. Cents Per Pound for Early Delivery

	Sept. 19	Sept. 20	Sept. 21	Sept. 22	Sept. 24	Sept. 25
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York	51.45	51.70	51.65	51.60	51.60	51.50
Zinc, East St. Louis	4.00	4.00	4.00	4.00	4.00	4.00
Zinc, New York	4.35	4.35	4.35	4.35	4.35	4.35
Lead, St. Louis	3.55	3.55	3.50	3.50	3.50	3.50
Lead, New York	3.70	3.70	3.65	3.65	3.65	3.65

\*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98-99 per cent, 22.90c. a lb., delivered; new No. 12, 19.50c. a lb., delivered. Aluminum, remelt No. 12 (alloy), carload lots delivered, 14.50c. a lb., average for week. Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered. Antimony, 8.75c. a lb., New York. Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

### From New York Warehouse

Delivered Prices, Base per Lb.	
Tin, Straits pig	53.50c. to 54.50c.
Tin, bar	55.50c. to 56.50c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	18.00c.
*High brass sheets	14.50c.
*Seamless brass tubes	17.00c.
*Seamless copper tubes	17.25c.
*Brass rods	18.00c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.50c.
Antimony, Asiatic	10.00c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ¾	32.00c. to 33.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

\*These prices are also for delivery from Chicago and Cleveland warehouses.

### From Cleveland Warehouse

Delivered Prices per Lb.	
Tin, Straits pig	55.75c.
Tin, bar	57.75c.

Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	4.75c. to 5.00c.
Lead, bar	7.75c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	60.25c.
Solder, ½ and ¾	33.75c.

### Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.25c.	7.00c.
Copper, hvy. and wire	5.75c.	6.50c.
Copper, light and bottoms	4.87½c.	5.75c.
Brass, heavy	3.12½c.	3.75c.
Brass, light	2.75c.	3.37½c.
Hvy. machine composition	4.75c.	5.25c.
No. 1 yel. brass turnings	4.37½c.	5.12½c.
No. 1 red brass or compos. turnings	4.25c.	5.25c.
Lead, heavy	2.87½c.	3.37½c.
Zinc	2.25c.	3.00c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.



## Reinforcing Steel

### Awards 1840 Tons—New Projects 1350 Tons

New York, 400 tons, Hudson River pier sheds, to Carroll-McCreary Co.

Brooklyn, N. Y., 360 tons, sewer, to Igloe Brothers.

Cattaraugus and Erie Counties, N. Y., 150 tons, mesh for miscellaneous highway projects, to American Steel & Wire Co.

Bronx Borough, N. Y., 110 tons, viaduct, to Truscon Steel Co.

Tioga County, N. Y., 100 tons, mesh for highway, to Wickwire Spencer Steel Co.

State of West Virginia, 400 tons, mesh for highway, to American Steel & Wire Co.

Riverside, Ill., 220 tons, Acme Steel Co., to Joseph T. Ryerson & Son, Inc.

Moline, Ill., 100 tons, school building, to Truscon Steel Co.

### NEW REINFORCING BAR PROJECTS

Milwaukee, 100 tons, Shorewood high school auditorium; bids Oct. 3.

St. Louis, 1000 tons, Hampton avenue viaduct; bids to be opened Oct. 16, previously given as Oct. 9.

St. Louis, 275 tons, substructure for St. Louis Post Office; bids to be opened Oct. 8; Klipstein & Rathmann, architects; W. J. Knight & Co., engineer, St. Louis.

Fairport, Ohio, 100 tons, for filter plant.

South San Francisco, 400 tons additional, George Washington school; bids taken Sept. 26.

San Jose, Cal., 300 tons, City auditorium; bids advanced to Oct. 8.

San Jose, Cal., 150 tons, Vasona dam and canal; bids Oct. 2.

San Francisco, 200 tons, printing and office building; bids under advisement.

Coalinga, Cal., 124 tons, high school science building, general contract awarded.

## Cast Iron Pipe

Chicago will take bids Oct. 3 on 320 tons of 36-in.

Naples, Tex., will soon asks bids for 2595 ft. 8-in.; 9500 ft. 6-in.; and 11,710 ft. 2-in. for water supply. Also for 60,000-gal. capacity elevated steel tank and tower, and pumping station. Fund of \$45,300 arranged. H. R. F. Helland, San Antonio, Tex., is consulting engineer.

Paris, Mo., asks bids until Oct. 4 for pipe line extensions for water supply, and 100,000-gal. elevated steel tank and tower. W. B. Rollins & Co., Railway Exchange Building, Kansas City, are consulting engineers.

El Monte, Cal., closed bids Sept. 17 for 1450 ft. 10-in. for water supply.

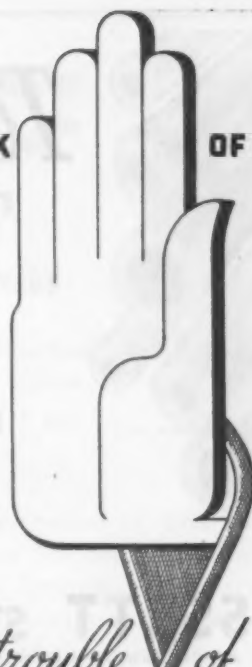
Watertown, Wis., closes bids Oct. 10 for 5200 ft. 6-in. for water supply lines.

Drakesboro, Ky., asks bids until Oct. 2 for pipe line system for water supply. Also for steel tank and tower, pumping equipment and other waterworks equipment. Westcott, Thornton & Sargent, Owensboro, Ky., are consulting engineers.

Board of District Commissioners, District Building, Washington, asks bids until Oct. 5 for 10,000 ft. 12-in., and 30,000 ft. 8-in., for water supply.

A PAGE FROM THE BOOK

OF EXPERIENCE



*Avoid the trouble of  
mixed steel by specifying*

# WYCKOFF COLD DRAWN STEEL

Uniform in analysis . . . accurate to size . . . straight throughout their entire length . . . bright, smooth and free from surface imperfections . . . with highly developed machining qualities that keep your costs within original estimates and eliminate unforeseen delays.

## WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Bldg., Pittsburgh, Pa.

Mills at Ambridge, Pa. and Chicago, Ill.

Manufacturers of

Cold Drawn Steels

Turned and Polished Shafting

Turned and Ground Shafting

Centreville, Mich., closes bids Oct. 9 for 16,500 ft. 8, 6 and 4-in. for water supply. Also for elevated steel tank and tower, pumping machinery, etc. Andrew Lenderink, Kalamazoo, Mich., is consulting engineer.

Calera, Ala., closed bids Sept. 27 for 2650 ft. 8-in., 13,300 ft. 6-in., and 13,850 ft. 2-in., for water supply. J. B. McCrary Engineering Corp., Atlanta, Ga., is consulting engineer.

Savoy, Tex., has plans for water system extensions, including 3600 ft. 6-in., and 1850 ft. 4-in.; 2622 ft. 1½-in., 1577 ft. 1¼-in., 2325 ft. 1-in., and 3500 ft. ¾-in., all galvanized. Also for pumping machinery and accessory equipment. Charles E. Haydon, Denison, Tex., is consulting engineer.

Michigan City, Ind., closes bids Oct. 2 for about 1400 ft. 12-in., for trunk line water supply. Greeley & Hansen, 6 North Michigan Avenue, Chicago, are consulting engineers.

Blackville, S. C., receives bids Oct. 2 for pipe lines for water supply. Also for two deep-well pumping units and accessories. Ryan Engineering Co., Arcade Building, Columbia, S. C., is consulting engineer.

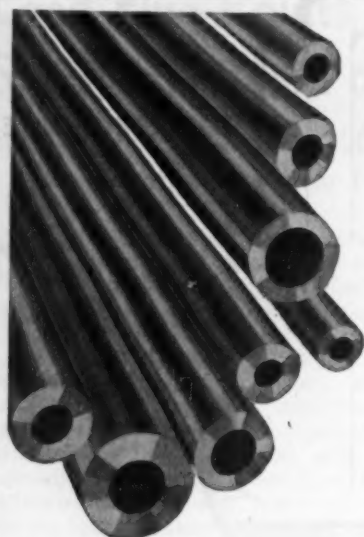
South Pasadena, Cal., awarded 168 tons of 6 and 10 in. to United States Pipe & Foundry Co.

Louisville, Colo., has placed 134 tons with an unnamed bidder.

Moab, Utah, has purchased 120 tons of 4-in. from an unnamed bidder.

Santa Monica, Cal., has awarded 147 tons to American Cast Iron Pipe Co.

San Francisco, Cal., has taken bids on 7460 tons of 12 to 20-in., for which United States Pipe & Foundry Co. is the only bidder.



# TOOL STEEL TUBING

NON-SHRINK  
OIL HARDENING  
NON-DEFORMING

for RING DIES  
CUTTING DIES  
SPACERS, BUSHINGS, Etc.

**THE BISSETT STEEL COMPANY**  
Manufacturers of BISCO Tungsten Carbide drawing dies and cutting tools

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## Fabricated Structural Steel

### Awards Decline—New Projects in Large Volume

**L**ETTINGS of 6030 tons compare with 17,650 tons in the previous week and 8900 tons two weeks ago. With the exception of 900 tons for bridges in Texas and 880 tons for a viaduct at Nashville, awards were all less than 600 tons. New projects of 33,265 tons are the third largest this year, the total being swelled by 23,000 tons for highway bridges in Missouri. The tonnage in new projects was 10,825 last week and 16,000 two weeks ago. Plate awards total about 300 tons. New plate projects, at 15,175, include 14,000 tons for an oil refinery in Argentina. Structural steel contracts in September, at 41,780 tons, compare with 69,680 tons in August, and 46,500 in July. Structural steel awards for the week follow:

#### NORTH ATLANTIC STATES

Niagara Falls, N. Y., 165 tons, addition to Acheson Graphite Corp., to McClintic-Marshall Corp.

New Britain, Conn., 145 tons, Holy Cross Church, to Berlin Construction Co., Inc.

State of Maryland, 165 tons, Catoclin Creek bridge, to Roanoke Bridge & Iron Works.

Baltimore, Md., 155 tons, highway bridge, to Shippers Car Line Corp.

Reading, Pa., 500 tons, school building, to McClintic-Marshall Corp.

Washington, 250 tons, seven-story addition to Internal Revenue Building, to Fort Pitt Bridge Works.

#### THE SOUTH

Nashville, Tenn., 880 tons, viaduct, to Nashville Bridge Co.

Dallas, Tex., 675 tons, underpass, to Mosher Steel & Machinery Co.

Tarrant County, Tex., 130 tons, bridge, to Virginia Bridge & Iron Co., Inc.

State of Texas, 900 tons, bridges, most of tonnage to Fort Worth Structural Steel Co.

#### CENTRAL STATES

East Liverpool, Ohio, 150 tons, Potter Lumber Co., building, to Pittsburgh Bridge & Iron Co.

Cincinnati, 125 tons, Clifton Avenue bridge, to American Bridge Co.

Clinton County, Ill., 475 tons, beam bridge, to American Bridge Co.

State of Minnesota, 110 tons, bridge No. 5382, to American Bridge Co.

State of Minnesota, 130 tons, bridge No. 5385, to Minneapolis-Moline Power Implement Co.

Bartleso, Ill., 475 tons, bridge, to American Bridge Co.

Decatur, Ill., 200 tons, post office, to Mississippi Valley Structural Steel Co.

Wood River, Ill., 150 tons, filter plant, to Banner Iron Works, Saint Louis.

Peyton, Colo., 125 tons, bridge, to Minneapolis-Moline Power Implement Co.

Los Angeles, 500 tons, University of Southern California chemistry building, to Consolidated Steel Corp.

Port Angeles, Wash., 125 tons, barking plant, to Isaacson Iron Works.

#### NEW STRUCTURAL STEEL PROJECTS

##### NORTH ATLANTIC STATES

Hanover, N. H.-Norwich, Vt., 350 tons, bridge.

Plymouth, N. H., 200 tons, highway bridge.

Worcester, Mass., 200 tons, highway bridge.

Elmira, N. Y., 300 tons, power house for State Reformatory.

New York, 500 to 1000 tons of sheet steel

piling, Federal office building and post office; bids to be taken Oct. 2.

Jersey City, N. J., 500 tons, plant addition for Joseph T. Ryerson & Son, Inc.

Philadelphia, 400 tons, city pier shed No. 96.

#### THE SOUTH

Nashville, Tenn., 400 tons, bridge.

Atlanta, Ga., 600 tons, viaduct.

#### CENTRAL STATES

Chicago, 600 tons, Lincoln Avenue bridge.

State of Illinois, 800 tons, bridges.

State of Missouri, 23,000 tons, highway bridges.

Ashland, Neb., 550 tons, filter plant.

State of Iowa, 525 tons, bridges.

Sioux Falls, N. D., 500 tons, high school.

Fargo, N. D., 450 tons, sewage plant.

Peshtigo, Wis., 175 tons, building.

Chicago & Northwestern Railway, 185 tons, bridge at De Witt, Iowa.

Trempealeau, Wis., 2200 tons, Mississippi River Dam No. 6.

State of Wisconsin, 700 tons, highway bridges.

Milwaukee, 125 tons, Shorewood high school auditorium; bids Oct. 3.

St. Louis, 200 tons, Hampton Avenue viaduct; bids to be opened Oct. 16; previously given as Oct. 9.

St. Louis, 350 tons, sheet steel piling, substructure for St. Louis post office; bids to be opened Oct. 8; Klipstein & Rathmann, architect; W. J. Knight & Co., engineer, St. Louis.

#### WESTERN STATES

State of Colorado, 360 tons, highway bridge.

State of Washington, 225 tons, bridge over Wynoochee River.

Grand Coulee Dam, Wash., 800 tons, cranes.

South San Francisco, 120 tons, George Washington school; bids taken Sept. 26.

San Jose, Cal., 100 tons sheet piling, Vasona dam and canal; bids Oct. 2.

Pullman, Wash., 200 tons, power house at Washington State College; bids under advisement.

#### FABRICATED PLATE

##### AWARDS

Queens County, N. Y., 115 tons, pipe for bridge LP-34-2, to McClintic-Marshall Corp.

Nome, Alaska, 200 tons, dredge, to Isaacson Iron Works.

##### NEW PROJECTS

New York, 12,000 to 14,000 tons, Standard Oil Co. of New Jersey, reconstruction of refinery in Argentina.

Philadelphia, 700 tons, water pipe line for city.

Fairport, Ohio, 125 tons, water tank and pipe line.

Kenosha, Wis., 250 tons, steel standpipe; Graver Tank & Mfg. Corp., Chicago, low bidder.

St. Louis, 150 tons, 10 steel pontoons for United States Engineer's Office; new bids due Oct. 6, bids received on Sept. 21 having been returned unopened due to the necessity of issuing addenda; no change in plans.

Brawley, Cal., 100 tons, tank, Chicago Bridge & Iron Co., low bidder.



## PWA Brought Steel Industry \$80,000,000

WASHINGTON, Sept. 25.—Steel works and rolling mills received orders, exclusive of rails, valued at more than \$63,000,000, from public works construction projects during the first year of the PWA, according to a statistical study submitted by the Bureau of Labor Statistics, Department of Labor, to Harold L. Ickes, public works administrator. The total values of materials was placed at \$414,000,000.

Rail orders having been \$17,000,000, the aggregate going to the steel plants was \$80,000,000, or slightly less than 20 per cent of the total. Orders for foundry and machine products were placed at nearly \$45,000,000 and, for railroad cars, \$34,000,000. It was pointed out that the total, estimated to have provided 1,100,000-man-months of employment in factories, does not include production and repair of machinery used both in manufacturing material and placing it on construction sites, nor materials resulting from \$723,000,000 in allotments from the PWA to the CCC and CWA.

The report will be published in detail by the Bureau of Labor Statistics in its August bulletin, which will be available about Oct. 1.

To show the stimulus given to various industries in the capital goods group, the bureau has compiled figures to show the employment in selected industries in July, 1933, when PWA was organized and began to function, and figures to show employment increases in those industries since that date. The statement gave the impression that PWA would be given most of the credit for the improvement. As a matter of fact, in steel, the chief bulge in orders and employment came from the automotive industry, independent of PWA funds. The industries to be listed in report are those which received orders for more than \$5,000,000 worth of materials.

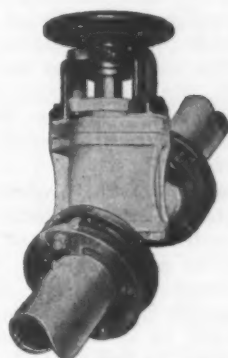
## Grigsby-Grunow Plant To Be Liquidated

ONE of the largest liquidations of recent years, that of the Grigsby-Grunow Co., Inc., Chicago, makers of radios, radio tubes and refrigerators, will begin on Oct. 1. The assets of the company will be liquidated under order of the United States District Court by Frank M. McKey, trustee in bankruptcy for the company.

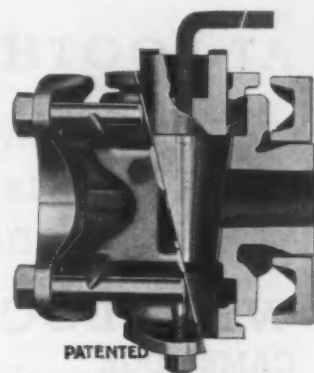
Machinery consists of all types of metalworking and woodworking machinery, a completely equipped radio tube plant, enameling plant and plating plant, all of which are in immedi-

## A valve is a valve until it "lets go"—then it's a you-know-what

But, sir, here's a couple of valves for acid work that have been called fewer names than most any valve you ever heard of.



DURIRON Y Valves in sizes from 1" to 6"



Cross-section DURIRON "PR" Plug Valve

And the reason is, that for corrosive solutions, Duriron Valves have more intestinal fortitude. They really enjoy the stuff, shunting it here and there at the will of the operator.

Friendly like, they stay on the job for years, without weakening.

Try one under your most severe conditions—it will show you a thing or two about long life.

*Bulletin 161—Duriron Valves—is yours for the asking, and Circular No. 102—Alloy Steel Valves—too, if you want it.*

## THE DURIRON COMPANY, Inc. 438 N. Findlay Street, Dayton, Ohio

Manufacturers of Corrosion-Resisting Equipment in

Duriron Durichlor Durimet Durco Alloy Steels Alcumite

ate operating condition. Inventory consists of made-up parts, parts in process and raw material for radios, refrigerators and radio tubes. The service department on all three items has been kept intact.

## Heating, Painting and Plumbing Aided By FHA

WASHINGTON, Sept. 25.—Study of a group of 718 modernization and repair loans among several thousand officially reported to the Federal Housing Administration, Sept. 21, show an interesting breakdown as to what the repairs and modernization were for.

The total dollar amount of these 718 repair loans was \$415,719, making the average loan \$579. Of the

loans made, following are the number of jobs and the purposes:

Purpose	No. of Jobs	Percentage
Heating .....	265	14.53
Inside painting and redecorating .....	264	14.47
Plumbing .....	252	13.82
Exterior repairs .....	177	9.70
Roofing .....	169	9.27
Outside painting .....	168	9.21
Remodeling, general .....	155	8.50
Interior repairs .....	102	5.59
Cementing .....	72	3.95
Lighting .....	64	3.51
Remodeling, bathroom .....	56	3.07
Additional rooms .....	44	2.41
Remodeling, kitchen .....	36	1.97
	1824	100.00

Caterpillar Tractor Co. had net profit of \$1,291,964 for August, and net profit of \$2,669,344 for the first eight months of 1934. This is equal to \$1.42 a share on the common stock.

## AT BOOTH 386—National Metal Exposition

We will exhibit interesting and unusual parts manufactured from our Hy-ten, Economo and S. A. E. Alloy Steels.

**WHEELOCK, LOVEJOY & COMPANY, INC.**  
CAMBRIDGE + CHICAGO + CLEVELAND + DETROIT

### Unemployment Reserves Given Further Study

WASHINGTON, Sept. 25.—The advisability of future legislation for the establishment of unemployment reserves was studied by a special committee of the Business Advisory and Planning Council at the sixth general meeting of that organization held here Thursday. Heading the special committee is Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt. Other members are Henry S. Dennison, Morris E. Leeds, W. A. Julian, Treasurer of the United States, John J. Raskob and Walter C. Teagle.

Mr. Teagle, chairman of the committee on Industrial Relations, reported to the council on the work of his committee which has been concerned with the study and determination of the principles which are felt desirable in the establishment of unemployment reserves. In close contact with Secretary of Commerce Roper, the council, meeting in the Department of Commerce Building, approved the selection of a special committee to study the subject which is expected to keep in close contact with other public and private agencies which are concerned with the problem.

Among reports heard by the council was one from the Small Industries Committee, of which E. C. Van Diest is chairman. It submitted a progress report which stressed the importance of the small industries in the American economic order and told of progress made in the work of compiling the data received from the capital requirements survey conducted by the committee. It was stated that 7000 completed questionnaires have come in from small manufacturing industries, disclosing information as to their need for additional credit, their experiences in obtaining capital through banks and Federal agencies which were empowered by legislation of the last session of Congress to make direct loans to industry, and their financial position. A report embodying the recommendations of the

committee is expected to be released within thirty days.

A. P. Greensfelder, chairman of the committee on Private Construction, presented a report which pointed out the effect which the great decline in the construction industry has had on unemployment. Mr. Greensfelder said his committee would occupy itself with surveying the possibilities of reviving construction.

A committee under the chairmanship of Walter S. Gifford was instructed to continue its study of the operations of the securities act. Mr. Gifford expressed the opinion that, after some months of observation, his committee would be in a position to advise the council on this subject.

A motion was passed authorizing the chairman of the council to appoint a committee to study and report on the revenue act of 1933, considering especially the influence of taxation on industry.

Four members of the council were elected to the executive committee to fill the vacancies created on the retirement of the previous incumbents who had fulfilled their period of service in accordance with the rotating system adopted by the council. The new members are Henry I. Harriman, Robert L. Lund, Mr. Raskob and Gen. R. E. Wood.

### Metal Congress Lectures In New York

TWO unusual lectures are announced among the features of the Metal Congress next week in New York, centered in the Port of New York Authority Building, 111 Eighth Avenue, that city. One of these will be delivered by R. S. Archer, metallurgist, Republic Steel Corp., Chicago, entitled, "Ferrous Metals Today and Tomorrow," and the other by Dr. Zay Jeffries, metallurgist, Aluminum Co. of America, on "Non-Ferrous Metals Today and Tomorrow." The Jeffries lecture is scheduled for October 2, at 5.30 p. m., and the Archer address for the same time on October

5. Both meetings will be held in the Hall of Commerce, of the Port of New York Authority Building.

T. H. Wickenden, assistant manager, Development and Research Department, International Nickel Co., Inc., New York, will preside on the Tuesday afternoon meeting and Dr. Edgar C. Bain, metallurgist, Research Laboratory, United States Steel Corp., will be chairman of the Friday meeting.

### Malleable Production Up in August

WASHINGTON, Sept. 25.—Making a gain of 492 net tons, the output of malleable castings in August totaled 23,910 tons, compared with 23,388 tons in July, according to the Bureau of the Census. Orders declined 556 tons to 21,306 tons, while shipments fell off 1807 tons to 25,784 tons. The August rate of operations was 27.8 per cent of capacity.

### Consider Manufacture Of Steel in Chile

WASHINGTON, Sept. 25.—Production of steel in Chile may eventuate if plans under consideration by the new iron and steel plant at Valdivia materialize, according to a report from the American consulate-general, Santiago, made public by the Commerce Department.

The Chilean Minister of Finance has requested Congress to appropriate approximately 21 million pesos (about \$875,000) to complete a subscription previously authorized by law to shares in the company. After a short period of operation of the new plant, the report states, it has been found that although possible production of pig iron can not be absorbed in the country, conversion into steel ingots will permit of their use within the country, which is now required to import such steel.



## August Iron and Steel Imports Rise Sharply

WASHINGTON, Sept. 25. — Iron and steel imports into the United States during August, amounting to 32,418 gross tons, registered the second highest monthly total of the year, and gained 14,742 tons over July receipts, but were 30.9 per cent under the tonnage received during the corresponding month of last year, according to an analysis made by the Commerce Department, iron and steel division.

The gains and losses in individual products were more or less evenly balanced, 14 increases as against decreases in 17 items. However, the 15,421-ton rise in pig iron receipts was more than sufficient to account for the larger total. Other increases of moment occurred in structural shapes, hoops and bands, steel ingots, etc., and sheets, skelp, and saw plate. The more pronounced decreases were registered in nails, tacks and staples, ferromanganese and spiegeleisen, barbed wire, merchant and other steel bars, and concrete reinforcing bars.

Pig iron amounting to 18,418 tons was the principal product received, coming chiefly from the Netherlands, British India, and Spain. Structural shapes totaling 2480 tons were next in importance, supplied principally by Belgium, France and Germany, while following were hoops and bands, received chiefly from Belgium, Germany, France and the United Kingdom. Ferromanganese and spiegeleisen amounting to 1818 tons were received from Norway, Canada and the United Kingdom, while merchant and other steel bars totaling 1675 tons were chiefly supplied by Belgium, Sweden, France and Germany.

Over the elapsed eight months of this year iron and steel imports have totaled 217,732 tons, 34,172 tons under the total for the corresponding period of 1933. During this period, the largest tonnages have been supplied by the Netherlands, Canada, Belgium, British India, Germany, Sweden and Norway.

## Ohio River Steel Shipments Lower

MOVEMENT of iron and steel products on the Ohio River in the Pittsburgh district in August amounted to 45,840 net tons, compared with 60,005 tons in July, 83,718 tons in June, and 69,531 tons in August, 1933, according to the latest report of the United States Engineer Office, Pittsburgh. Total movements of steel products on the Monongahela River in August were 32,412 tons, compared with 41,231 tons in July, and 67,389

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tons in August, 1933. Shipments of iron and steel on the Allegheny River last month totaled 2015 tons.

## Sand Control Course For Foundry Convention

FUNDAMENTALS of sand control will be covered in four sessions during the American Foundrymen's Association Convention in Philadelphia, October 22-26. The schedule of the course, which was developed by a committee under the chairmanship of W. G. Reichert, Singer Mfg. Co., Elizabethport, N. J., is as follows: October 22, Application of Sand Control to Continuous and Jobbing Foundries; October 23, Classification of Foundry Sands; October 24, Casting Defects Caused by Sand, Causes and Remedies; and October 25, Core Sands and Core Binders. Foundrymen who will summarize the topic of the day, then will give an opportunity to those present to ask questions about their own problems, include: A. V. Leun, Bethlehem Steel Co., L. B. Knight, Jr., National Engineering Co., R. F. Harrington, Hunt-Spiller Mfg. Co., A. C. Jones, Lebanon Steel Foundry, and F. W. Shipley, Caterpillar Tractor Co.

A cast-iron melting course for practical shop men has also been planned by a committee headed by P. T. Baneroft, foundry superintendent, John Deere Harvester Works, East Moline, Ill. General cupola practice, cupola melting, small cupolas and their operation, and electric furnace melting will be taken up in the order given.

## NACC Petitions for Detroit Base on Steel

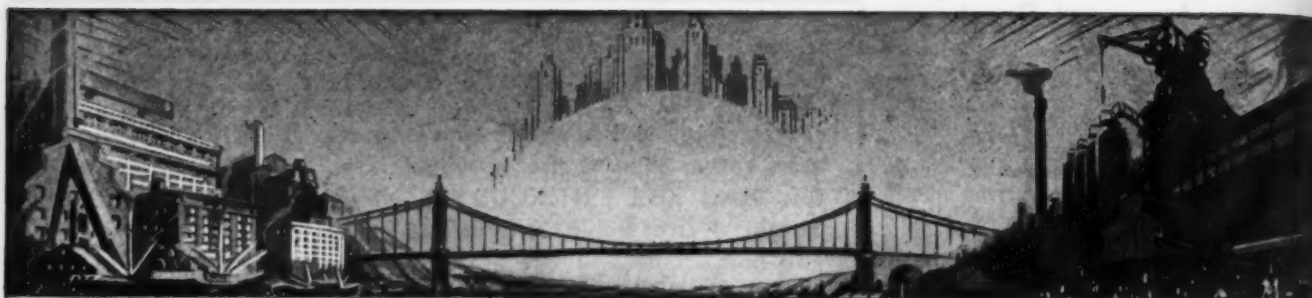
WASHINGTON, Sept. 25. — The National Automobile Chamber of Commerce has petitioned the American Iron and Steel Institute to establish Detroit as a basing point for automotive steel products. A copy of the petition has been filed with NRA. Announcement of the request was made by the NACC.

## Canadian Brass Rolling Mill Represents Advanced Practice

(Concluded from Page 27)

a gage variation of less than three-quarters of one thousandth from edge to center and end to end is easily obtained.

When metal is specified to be shipped either full hard or soft it can be rolled to finish gage on the 4-high mill without difficulty as it is a comparatively simple matter to maintain the surface condition and shape of the rolls when rolling wide metal of one standard width but when the metal is specified to be shipped  $\frac{1}{4}$  or  $\frac{1}{2}$  hard it is taken from the small 4-high mill at the ready-to-finish point, slit, annealed and finished on standard 2-high rolling mills which require no description.



## PLANT EXPANSION AND EQUIPMENT BUYING

### Machine Tool Market Continues Dull — Automotive Buying Lacking

**W**ITH the continued absence from the market of the automotive industry, buying of machine tools and machinery in the last week has continued very light. Prospective purchasers in lower Michigan are still doubtful regarding their plans for new models and general business uncertainty is unquestionably a depressing factor.

New inquiry, which showed some improvement earlier in the month, has again fallen off, and most of the lists upon which builders have been figuring are dormant.

#### ◀ NEW ENGLAND ▶

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until Oct. 2 for three motor-driven two-spindle drilling machines for Newport, R. I., Navy Yard (Schedule 3326); until Oct. 5, 13 hoist units, seven control equipments and spare parts for Fore River, Mass., and Washington yards (Schedule 3390).

**Board of Public Works**, Bridgeport, Conn., will soon take bids for new municipal incinerator, including furnaces, loaders, conveyors and other mechanical equipment. Cost about \$150,000 with machinery. F. E. Toquet is city engineer.

**Hanley Mfg. Co.**, Stamford, Conn., has been organized by Isidor Chester and M. C. Hanley, 33 Brooklawn Avenue, to manufacture special cutting equipment and devices, razor appliances, etc.

**Comfortaire Corp.**, New Haven, Conn., has been organized by John C. Ransley and J. Alfred Kroner, 12 Beacon Street, Hamden, Conn., to manufacture air-conditioning equipment and parts.

#### ◀ NORTH ATLANTIC ▶

**Union Carbide & Carbon Corp.**, 30 East Forty-second Street, New York, has work under way on initial units of addition to plant at Whiting, Ind., to be followed by other one-story structures. Cost over \$5,000,000 with equipment.

**Costa Trucking Co.**, 319 Washington Street, New York, has leased four-story building on site 100 x 100 ft., at 209-13 Thompson Street, part of structure to be used for new machine and repair shop for company motor trucks, including parts production, etc.

**Moto-Air Conditioner Mfg. Co., Inc.**, Brooklyn, has been organized by Nicola Vessio, 184 Veronica Place, and Victor F. Testa, 1269 East Nineteenth Street, to manufacture air-conditioning equipment and parts.

**Raritan Copper Works**, Perth Amboy, N. J., affiliated with Anaconda Copper Mining Co., New York, has approved plans for one-story

metal treating shop. Cost close to \$30,000 with equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until Oct. 5 for 250 storage battery testing outfit hydrometers, 600 storage battery testing outfits, etc., for Brooklyn Navy Yard; until Oct. 9, electric log equipments and spare parts for Brooklyn and Philadelphia yards (Schedule 3292); until Oct. 2, seven air compressors (Schedule 3339); until Oct. 9, indicator systems and spare parts (Schedule 3350) for Brooklyn, Philadelphia and Charleston, S. C., yards.

**National Aniline & Chemical Co., Inc.**, 40 Rector Street, New York, has leased three-story building at 178-80 Washington Street, and will remodel for new factory branch storage and distributing plant.

**Sinram Brothers, Inc.**, 415 East Thirty-seventh Street, New York, coal, has acquired property, 166 x 352 ft., on Harlem River at East 138th Street, for new storage and distribution plant, with construction of coal pockets, conveying and loading machinery, and other equipment.

**Board of Education**, Floral Park, N. Y., plans manual training department in new multi-story school, for which bids will be asked on general contract in October. Cost \$390,000. Financing has been arranged through Federal aid. Knappe & Morris, 192 Lexington Avenue, New York, are architects.

**Tide Water Oil Co.**, 17 Battery Place, New York, plans new bulk oil storage and distribution plant on 6½-acre tract at Syracuse, N. Y., lately acquired, with steel tanks and other equipment. Cost over \$50,000 with equipment.

**Weyant & Becker, Inc.**, New York, has been organized by Charles M. Weyant and William M. Becker, 3 Coenties Slip, to manufacture machinery and parts.

**Thropp Foundry Co., Inc.**, Trenton, N. J., has been organized by James W. Thropp, Trenton, and associates, to take over former plant of John E. Thropp's Sons, Inc., Bloomsbury and Mill Streets, general machinist and founder, recently secured at public sale.

**Quality Vacuum Products Corp.**, East Orange, N. J., has been organized by Wil-

liam Weickardt and Ewald W. Dietz, Jr., 545 North Arlington Avenue, to manufacture vacuum equipment for chemical plants, radio tubes and kindred products.

**Quartermaster Depot**, Twenty-first and Johnston Streets, Philadelphia, asks bids until Oct. 2 for 100 kegs wire nails and 50 kegs common nails (Circular 103).

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until Oct. 2 for 500 check valves for hydrostatic type aircraft fuel quantity gage (Schedule 3335); 250 switches, 250 switch leads, 900 thermocouple leads, etc. (Circular 3340) for Philadelphia Navy Yard.

**Pennsylvania Railroad Co.**, Philadelphia, has approved plans for electrification of yards at Bristol, Pa., and for similar work on lines used for industrial plants at that place.

**Krauter & Co., Inc.**, 583 Eighteenth Avenue, Newark, N. J., manufacturer of tools, motor car heaters, etc., has recently organized Krauter & Co. of Canada, Ltd., to operate branch plant at 103 Church Street, Toronto, primarily for assembling motor car heaters for Canadian trade.

#### ◀ BUFFALO DISTRICT ▶

**Summit Foundry Co.**, Geneva, N. Y., manufacturer of stoves and ranges, parts, etc., recently in receivership, has been reorganized, and will resume operations at once. L. F. Millington will be general manager of new company.

**Swift & Co.**, Chicago, meat packers, have let general contract to Austin Co., Cleveland, for one-story branch plant at Elmira, N. Y., including cold storage and distributing units. Cost about \$70,000 with equipment. A. E. Bump, company offices at 25 Faneuil Hall Square, Boston, is engineer.

**Canadian Radiator Mfg. Co., Ltd.**, Toronto, affiliated with Auto Radiator Mfg. Co., 2901 Indiana Avenue, Chicago, manufacturer of automobile radiators, heaters and allied products, has leased space at 196 Adelaide Street West, Toronto, for branch plant.

#### ◀ OHIO AND INDIANA ▶

**Middletown Distilling Corp.**, 1103 Mahoning Bank Building, Youngstown, Ohio, recently organized, has let general contract to Heller Brothers Co., Thurman and Furnace Streets, for extensions and improvements in plant of Western Reserve Brewing Co., Warren, Ohio, lately acquired. Plant will consist of six main buildings, with new storage and distributing unit and other structures. Cost over \$125,000 with machinery. Charles Owsley, Home Savings Bank Building, Youngstown, is architect. E. E. Welch is president.

**Meriam Co.**, 1955 West 112th Street, Cleveland, manufacturer of couplings, meters, gages and kindred equipment, has plans for one-story addition, primarily for gas and oil engine rebuilding and repair division. Cost over \$25,000 with equipment.

**Reliable Rubber Co.**, Toledo, Ohio, has been organized by E. C. Fitzgerald and John S. Pratt, care of Herman R. Miller, Nicholas Building, representative, to manufacture rubber specialties for automobiles, and mechanical rubber goods. New company will take over a plant on Bellevue Road for early production.

**Material Division, Air Corps**, Wright Field, Dayton, Ohio, asks bids until Oct. 8 for gun mount type adapter assemblies, gun type sight



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Production Runs!



## Emulsifying CUTTING OIL

### • Step Your Machines Up to Rated Capacity with Sunoco

The high speed, flexibility and fast metal-removing capacity of modern machine tools are utilized to their fullest extent only when a cutting oil of known quality and proven worth is used.

With Sunoco Emulsifying Cutting Oil, increased machine speed, longer runs per tool grind, less lost time for resetting, greater accuracy and better finish are made possible.

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Sunoco is hygienic. Bacteriological tests prove that it will not permit the development of pus-forming bacteria, or pathogens which cause skin inflammation.

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**The Operations Shown**  
(At left)  
Courtesy of Diamond Screw  
Products Co., Detroit  
Operation: Automatic nut  
blanking  
Material: Cold rolled steel  
Speed: 4000 r.p.m.  
Production: 350 to 500  
pieces per hour  
Lubricant: 1 part Sunoco  
to 15 parts water  
(At right above)  
Courtesy of Ray Day Piston  
Corp., Detroit  
Operation: Finish grind  
aluminum piston  
Machine: Landis Grinder  
Wheel Speed: 1300 r.p.m.  
Work Spindle: 225 r.p.m.  
Stock Removed: .015 inch  
Coolant: 1 part Sunoco to  
50 parts water



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LABORATORY TESTED

**COLD DRAWN BARS**  
EXTRA WIDE FLATS

**TURNED SHAFTING**  
SPECIAL SECTIONS

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ALLOY STEELS

## BLISS & LAUGHLIN, INC.

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assemblies, ammunition type magazine assemblies, magazine mount assemblies, etc. (Circular 121); until Oct. 9, 400 pressure gages (Circular 135); until Oct. 10, 800 bomb type shackle assemblies, 400 bomb release handle assemblies, 88 bomb rack assemblies (Circular 120); until Oct. 12, 100 to 250 navigation compass assemblies (Circular 123); until Oct. 28, four air-cooled compressors, belt-driven type (Circular 116).

Youngstown Steel Door Co., Austintown district, Youngstown, Ohio, has let general contract to Heller-Murray Co., 222 West Rayen Street, for one-story addition to steel fabricating works, part of unit to be used for storage and distribution. Cost about \$70,000 with equipment.

Standard Oil Co. of Indiana, Anderson, Ind., has let general contract to T. P. Kelly & Son, Anderson, for new bulk oil storage and distributing plant, including one-story motor truck service, repair and garage building. Cost about \$60,000 with tanks and equipment.

MODERN designs often call for artistic applications of steel, as in exposed shafting or special parts.

Appearance counts—in machines as well as in men—and the practical product of today combines beauty and utility, pleasing the eye while performing its work. This new trend is reflected in the latest types of equipment by streamline design, simplicity of form, and highly polished surfaces.

For all such uses where precision and fine finish are features of your product, you can specify B & L Small Rounds drawn, ground and polished with the assurance that they will meet the most exacting requirements.

This economical grade of B & L bar stock gives you a class of steel that assures the maximum degree of smoothness and mirror-like finish, free from even the most minute surface blemishes.

Its close adherence to size tolerances—its extreme accuracy, concentricity and uniformity—are factors that will contribute to the quality of your product. Ask our representative for details or write us direct.

### ◀ SOUTH ATLANTIC ▶

City Council, Fayetteville, N. C., plans extensions and improvements in municipal electric light and power plant, including equipment. Fund of \$26,000 is being arranged. W. C. Olsen, Raleigh, N. C., is consulting engineer.

Quartermaster Office, Fort McPherson, Atlanta, Ga., asks bids until Oct. 2 for supply of units of portable buildings, each unit comprising 10 buildings (Circular 3).

Potato Products Co., Quitman, Ga., recently organized to manufacture starch under a special process, care of Conrad O. Hersam and C. E. Drummond, Jr., Walton Building, Atlanta, Ga., consulting engineers, will soon ask bids on general contract for main one-story unit, 30 x 200 ft., with wing extension, 60 x 60 ft.; power house, 40 x 40 ft., and other structures. Cost close to \$200,000 with equipment.

Grinnell Co., Inc., 240 North Highland Avenue, Atlanta, Ga., manufacturer of water sprinkler systems, valves, fittings, etc., with headquarters at Providence, R. I., let general contract to Smith-Pew Construction Co., 702 West Peachtree Street, N. W., Atlanta, for extensions and improvements in branch plant. Cost about \$30,000 with equipment. Robert & Co., Bona Allen Building, Atlanta, are architects and engineers.

### ◀ WESTERN PENNA. ▶

New Castle Refractories Co., New Castle, Pa., has acquired former plant of Kenilworth Tile Corp., Newell, W. Va., idle for about four years, and will remodel for branch plant.

United States Engineer Office, Keenan Building, Pittsburgh, asks bids until Oct. 16 for new Tygart River Valley reservoir dam, near Grafton, W. Va., including 1,890,000 lb. reinforcing steel, 115,000 lb. structural steel, 16,200 lb. iron castings, safety treads, cast iron drain boxes and covers, control mechanism, pipe, etc. (Circular 66). Later site will be developed for hydroelectric generating plant. Entire project will cost about \$12,000,000.

Town Council, Peterstown, W. Va., T. E. Ballard, mayor, asks bids until Oct. 4 for equipment for municipal waterworks and distributing system. Wiley & Wilson, Lynchburg, Va., are consulting engineers.

### ◀ SOUTH CENTRAL ▶

A. Ph. Stitzel Co., affiliated with W. L. Weller & Sons, Starks Building, Louisville, distillers, has plans for new distillery at Jeffersonton, Ky., with power house, machine shop and other mechanical departments. Cost over \$80,000 with equipment. J. P. Van Winkle is president of Stitzel organization.

Tennessee Valley Authority, New Sprinkle Building, Knoxville, Tenn., and City Council, Dayton, Tenn., plans electric power transmission line from Athens, Tenn., to Dayton, where power will be furnished by TVA, to include substation, switching station and distribution lines. Cost over \$75,000.

Common Council, Camden, Tenn., plans call for bids early in October for pumping machinery and auxiliary equipment, pipe lines, etc., for waterworks extensions and improvements. J. E. Switzer, Engineering Building, Knoxville, Tenn.

Roux Crate & Lumber Co., Tampa and Bartow, Fla., manufacturer of wirebound boxes, crates, etc., has acquired former plant of Benson-Beckman Paint Co., Mobile, Ala., on 5-acre tract, for new works. Structures will be remodeled and new machinery installed, site to be developed as future main plant. Keysville Lumber Co., Keyville, Fla., will have joint interest in new works. Cost over \$150,000 with machinery.

### ◀ MIDDLE WEST ▶

Pheoli Mfg. Co., 5700 West Roosevelt Road, Chicago, manufacturer of bolts, screws, nuts, etc., has let general contract to G. W. Bland & Co., Inc., 32 West Randolph Street, for one-story addition, 70 x 190 ft. Cost about \$30,000 with equipment. Alfred S. Alschuler, 28 East Jackson Boulevard, is architect.

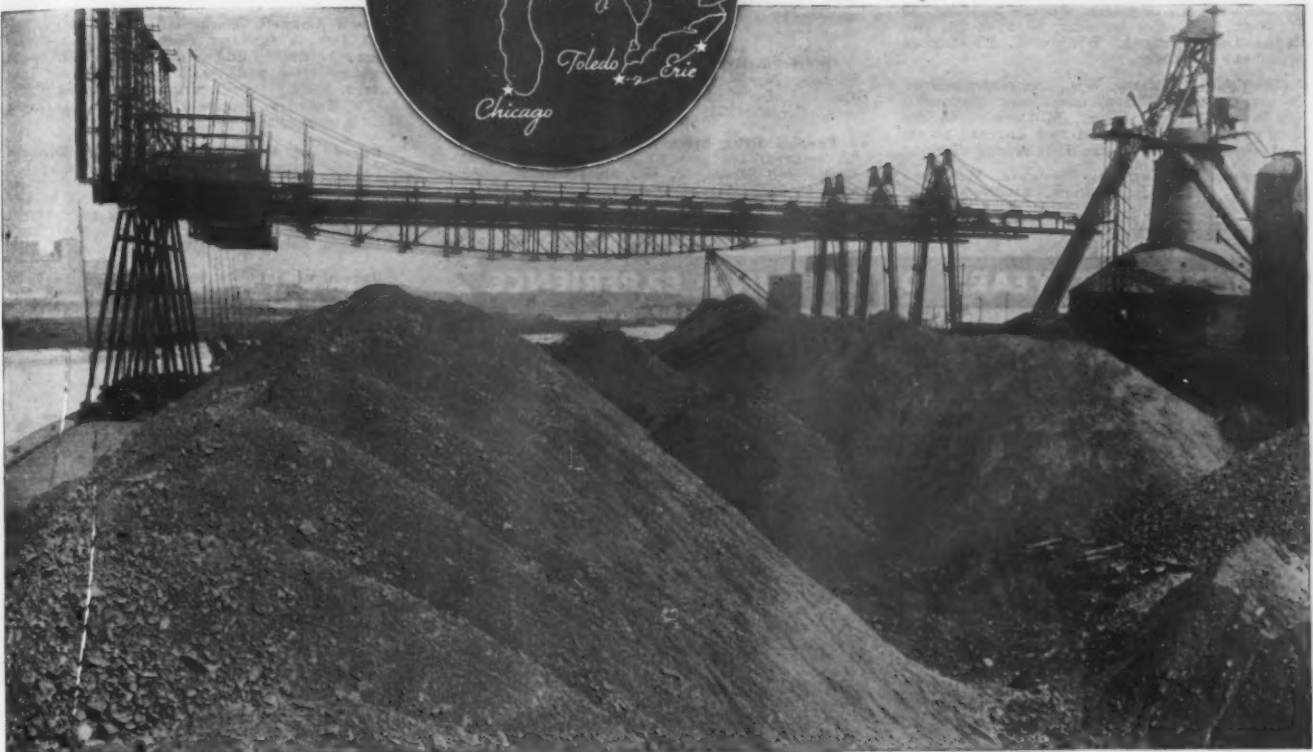
Sherwin-Williams Co., Cottage Grove Avenue and 115th Street, Chicago, manufacturer of paints, oils, varnishes, etc., has filed plans for three-story addition, 60 x 127 ft., for which general contract recently was let to A. S. Low, 510 North Dearborn Street. Cost over \$50,000 with equipment. W. H. Farnum, last noted address, is architect. Company headquarters are at Cleveland.

Theodore Hamm Brewing Co., St. Paul, Minn., has plans for three-story, 100 x 125 ft. malting plant unit. Cost over \$100,000 with equipment. C. H. Johnston, 360 Robert Street, is associate architect.

District Commander, Fifteenth Forestry District, Camp Honey Creek, West Allis, Wis., asks bids until Oct. 1 for power house, pumping plant, one-story equipment storage and distribution building, automobile service, repair and garage building and other structures at Camp Estabrook, Milwaukee (Circular 120).

Independent School District, Groton, S. D., will receive bids until Oct. 12 for school for power house in high and grade school.





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FEDERAL PERRY TOLEDO ZENITH

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DULUTH TOLEDO

Perkins & McWayne, Sioux Falls, S. D., are architects.

**Rocky Mountain National Park, Estes Park, Colo.,** Edmund B. Rogers, superintendent, has plans for one-story machine and repair shop, 40 x 103 ft.

**City Council, Glendive, Mont.,** August Colin, city clerk, asks bids until Oct. 1 for pumping machinery, recarbonation equipment, flocculator, flow controller, etc., for municipal water plant.

**Joseph T. Ryerson & Son of Wisconsin, Inc.,** 244 South Nineteenth Street, Milwaukee, has started work on new steel storage building, 90 x 130 ft., and office building, 32 x 48 ft., two stories and basement. William F. Eichfeld is consulting engineer.

**City Council, Adams, Wis.,** has commissioned Robert Cramer & Son, consulting engineers, 647 West Virginia Street, Milwaukee, to design new sewerage system and disposal plant. Cost about \$65,000. Oscar Hitt is city clerk.

**Hamburg Brewing Co., Waukegan, Wis.,** has plans by Urban F. Peacock, architect, 3405

West Lisbon Avenue, Milwaukee, for new brewing and bottling plant. Cost about \$135,000 with equipment.

**City Council, Kenosha, Wis.,** has ordered plans drawn for new garbage incinerating plant, to cost about \$105,000. H. C. Laughlin is city manager.

## WASHINGTON DISTRICT

**Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore,** asks bids until Oct. 8 for 94 two-wheel command post trailers (Circular 42).

**Quartermaster Depot, Twentieth and C Streets, N. W., Washington,** asks bids until Oct. 11 for 180 gasoline-electric generating sets (Circular 53).

**Peoples Drug Stores, Inc., Washington,** has let general contract to Earl S. Haislip, 426 Crittenden Street, N. W., for four-story addition to bulk storage and distributing plant at

77 P Street, N. E. Cost about \$90,000 with mechanical-handling and other equipment. Russell O. Kluge, Union Trust Building, is architect.

**Board of District Commissioners, District Building, Washington,** asks bids until Oct. 2 for boiler and accessories for Shaw junior high school.

**General Purchasing Officer, Panama Canal, Washington,** asks bids until Oct. 1 for screw clamps, breast drills, twist drills, hand taps, reamers, jointer planes and other tools (Schedule 2997).

**Town Council, Burkesville, Va.,** asks bids until Oct. 5 for two deep-well motor-driven pumping units and accessories, 75,000-gal. elevated steel tank and tower, pipe lines, meters, etc., for municipal waterworks. J. B. McCrory Engineering Corp., Atlanta, Ga., is consulting engineer.

**Bureau of Supplies, Procurement Division, Treasury Department, Washington,** asks bids until Oct. 1 for bolts, nuts, rivets, screws, washers, etc., as required from Jan. 1 to Oct. 31, 1935 (Class 43); hand trucks, dolly trucks, platform trucks, truck wheels, hose reels, horseshoe nails, etc. (Class 69).

**Bureau of Supplies and Accounts, Navy Department, Washington,** asks bids until Oct. 5 for machine screws and nuts, and wood screws (Schedule 3350); brass and steel bolts and nuts (Schedule 3352) for Eastern and Western navy yards.

## MICHIGAN DISTRICT

**Chrysler Corp., Detroit,** has asked bids on general contract for one-story addition to plant of Plymouth Automobile Division, for storage and distribution. Cost over \$60,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

**Bashead Ale & Brewing Co., Port Huron, Mich.,** recently organized, has acquired building previously occupied by Albert B. Parfet Co., and will remodel for new brewery. Cost about \$50,000 with machinery.

**Centripetor Co., Detroit,** has been organized by Arthur A. Bull, 3925 West Fort Street, and associates, to manufacture mechanical equipment and devices.

**Maxwell Lewis, Ovid, Mich.,** and associates have plans for new oil refinery near Elsie, Mich. Cost about \$80,000 with machinery. Storage and distribution units will be installed. E. G. Guy is company engineer.

**Universal Specialty Co., Grand Rapids, Mich.,** C. B. Jentink, president, manufacturer of rubber specialties, has taken over property at Big Rapids, Mich., and will establish new plant there, to replace Grand Rapids factory recently destroyed by fire.

## SOUTHWEST

**City Council, Farmington, Mo.,** has plans for new municipal electric light and power plant and distribution system. Fund of \$141,000 has been arranged through Federal aid. Arthur L. Mullergren, Fairfax Building, Kansas City, Mo., is consulting engineer.

**United States Engineer Office, Postal Telegraph Building, Kansas City, Mo.,** asks bids until Oct. 2 for two centrifugal pumping units and accessory equipment (Circular 126); until Oct. 3, four duplex boiler feed pumps and auxiliaries (Circular 127).

**City Council, Hayti, Mo.,** Frank Morgan, Jr., city clerk, asks bids until Oct. 1 for motor-driven turbine pumping machinery and accessories, iron removal plant equipment, settling tank, lime feed machine, filter equipment, pipe lines, valves, etc., for municipal waterworks. W. A. Fuller Co., 2916 Shenandoah Avenue, St. Louis, is engineer.

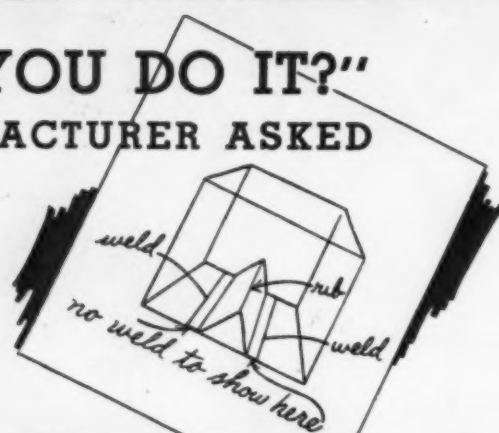
**Mississippi Valley Equipment Co., 511 Locust Street, St. Louis,** has inquiries out for coal crusher, portable stacking machine, portable air compressors, water turbine and electric generator unit, transformers, hopper gondola cars, filter presses, belting, etc.

**Seitz Packing & Mfg. Co.,** Sixteenth and Commercial Streets, St. Joseph, Mo., meat packer, will proceed with erection of one-story and basement addition and improvements in present plant. Cost about \$35,000 with equipment. Menges-Mange, Inc., 1515 North Grand Avenue, St. Louis, is architect.

**Bureau of Supplies and Accounts, Navy Department, Washington,** asks bids until Oct. 9

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"YOU BET!"

ANSWERED THE T.-G. ENGINEER

THEY were discussing a production problem. It involved welding a triangular rib to the inside of a metal tank. Just to make it harder, no evidence of the weld could show on the outside of the tank.

As a result of this conversation a new and ingenious spot welding machine was developed—The Double Arm Series Spot Welder. It makes two welds in series, one on either side of the rib, using the copper surface which supports the work as a short-circuiting block to complete the series and to eliminate depressions on the outside of the tank.

Whether your production problem calls for a special machine like this or the application of standard equipment, Thomson-Gibb welding experts can be of invaluable assistance. Their knowledge and experience is available to you for the asking. The memo below, filled in and attached to your letterhead, will bring you the latest welding facts applying to your product.

## THOMSON-GIBB ELECTRIC WELDING CO.

Thomson-Gibb Electric Welding Company

162 Pleasant Street, Lynn, Mass.

Gentlemen:

- ☐ Please ask your nearest engineer to arrange for an appointment at our plant.  
☐ Please MAIL information on the welding of

Product ..... Metal .....

Approximate dimensions .....

Desired production per hour .....

6147



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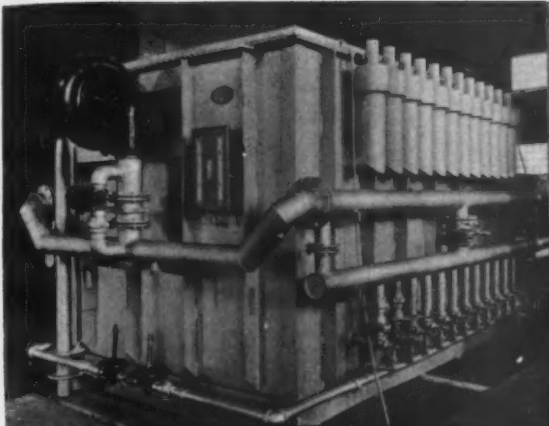
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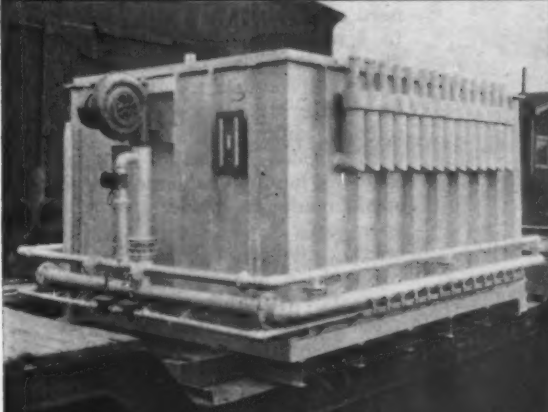
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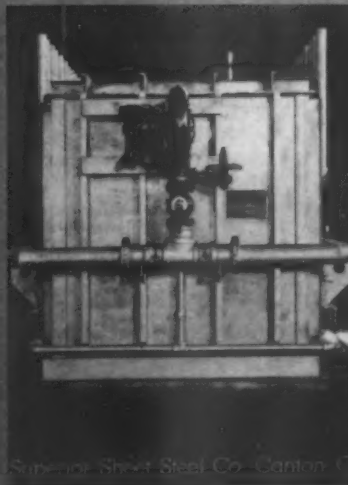
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## LINK-BELT *Presents* **SILVERSTREAK SILENT CHAIN**

**A NEW NAME** and a distinctive identification for this distinguished power transmitter. Retained: All the durable qualities, the same reliability and low maintenance, the same satisfaction in power transmission, that have produced performance records of 10, 15, 20, 25 and even 30 years of service.

In Link-Belt Silverstreak Silent Chain the links are blued and the washers and guide links given a silvery appearance. When in motion the chain presents a silvery streak. Write for further information. Address nearest office.

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for one engine-generator set and spare parts (Schedule 2378) for Galveston, Tex., Station.

American Cooling Tower Co., Inc., Kansas City, Mo., has been organized by Nathan Baraban, 4746 Roanoke Parkway, and associates, to manufacture cooling towers and kindred power plant equipment.

### ◀ FOREIGN ▶

Tinsley Wire Industries, Ltd., Wolverhampton, England, recently organized, has taken over a local factory for production of line of mattress parts, including chains and links, springs, hooks, etc.

Secretary of Public Works, Supplies and Tenders, Wellington, New Zealand, asks bids until Nov. 27 for two 24,000-kva. electric generators, two 30,000-hp. water turbines and auxiliary equipment for power station.

Ministry of Industries, Government of China, Nanking, China, has approved plans for locomotive erecting shop at Canton, China, with facilities for parts production, assembling, etc. Cost over \$600,000 with equipment. Contract for building units has been awarded to Francis Morton & Co., Liverpool, England, steel fabricators.

Soviet Russian Government, Moscow, has plans for new paper and pulp mill at Krasnoyarsk, Siberia, for production of newsprint, writing papers and cardboard. Cost

over \$2,000,000 with machinery. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

### ◀ PACIFIC COAST ▶

Board of Education, City and County of San Francisco, City Hall Civic Center, San Francisco, plans vocational training department in new two-story school at Twenty-fifth and Bryant Streets. Cost about \$300,000 with equipment. Martin J. Rist, Phelan Building, and Charles F. Strothoff, 2274 Fifteenth Street, are architects.

Mellgren Mines Corp., Tombstone, Ariz., care of Louis Heilbron, Texarkana, Tex., treasurer, recently organized, plans new gold and silver mining plants near Tombstone, including ore mill, power house, machine shop and other units. Cost close to \$300,000 with machinery. Company is arranging financing in amount of \$420,000 for project and working capital. R. E. Grace, Phoenix, Ariz., is secretary.

Gold Standard Mines Co., Kingman, Ariz., is planning early rebuilding of Katherine mill, near Kingman, recently destroyed by fire. Loss over \$100,000 with machinery.

Bureau of Reclamation, Denver, asks bids until Oct. 15 for three deep-well turbine motor-driven pumping units, each 5000-gal. per min. capacity; one similar type pumping

unit, 1600-gal. per min. capacity; two portable pumping units, similar type, 1600-gal. per min.; 12 gear or screw type, motor-driven, oil pumping units, about 100-gal. per min. each capacity; one similar type pumping unit, 50-gal. per min. capacity; one similar type, 7-gal. per min. capacity; one portable high-pressure rotary piston type motor-driven pump and accessories, about 1/2-gal. per min. capacity; 15 water jet eductors; two air compressors, 330-cu. ft. per min.; one air compressor, 180-cu. ft. capacity per min.; two air receivers and four pressure regulators for Boulder Dam power plant, Boulder Canyon Project, California-Arizona (Specification 596).

City Council, Murray, Utah, plans extensions and improvements in municipal electric light and power plant, including new Diesel engine-generator unit and accessories. Fund of \$33,000 has been arranged through Federal aid.

## Mill Engineers Survey Mechanical, Lubricating and Electrical Develop- ments

(Continued from Page 50)

Reference to speed regulation led to quite an animated but one-sided discussion of special speed regulation for continuous mills, indicating a trend in the sentiment of steel plant engineers toward simplification of motor drive and consequently a reduction in cost of motor equipment. L. A. Umansky, General Motors Co., said that close speed regulation is not necessary and when installed frequently is not used or is taken out. Only the conventional design of motors is required and he held that speed need not be controlled closer than 2 to 4 per cent. Looping of strip between stands due to change of speeds is not of importance in a strip mill, he said. Mr. Davis added that, in tension, rolling mills could be driven with a speed regulation of 2 to 4 per cent, but having that much speed variation made it harder for the mill operator. F. W. Cramer, chief electrician, Republic Steel Corp., favored the elimination of frills on motors and a simplicity of drive. Too much attention has been given to speed regulation, he said. Mill men should think less of regulation and more about the load on the motors.

Individual motor drives for run-out tables and coilers and dynamic braking through direct current was the subject of a very comprehensive and highly technical paper by F. E. Harrall, assistant chief engineer, and C. V. Gregory, engineer, Reliance Electric & Engineering Co., Cleveland. The paper was largely devoted to a discussion of the application of the individually motor-driven table rollers and coilers in the continuous 72-in. hot-strip mill plant of the Otis Steel Co.

The first application of motor-driven rollers, the authors said, was about 12 years ago, when individual squirrel-cage induction motors were geared to individual rolls. The first strip mill of note to have motor-

(Continued on Page 88)





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## FORGINGS worthy of your GOOD NAME



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When you use Asco Forging Billets you know the finished forging will be of undisputed high quality, worthy to bear your good name.

To stand up under extreme stresses and abuse, your forgings demand the finest forging billets, produced under the most exacting laboratory control, from the selection of raw materials through processing in the furnace, teeming, rolling, with liberal discard at the shears to eliminate pipes and blowholes, thorough chipping and repeated inspections.

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(Continued from Page 86)

driven rollers was the Columbia Steel plant at Butler, Pa., where 130 motors were installed on a single run-out table, this installation still being in service after ten years' operation. Several similar installations have since been made on roller drives in various steel plants.

Individual motor drives, the authors stated, are used to best advantage on hot run-out tables of continuous strip mills where automatic control for starting, running and stopping and rapid acceleration are important. The Otis mill table has 71 10-in. diameter rollers with an operating speed

of 600 to 1200 ft.p.m. The duty cycle under which these motors are operated and which occurs two or three times a minute is starting, 7 sec.; running, 10 sec.; stopping, 2 sec. The quick stop from the full running speed in 2 sec. is accomplished by direct-current braking, which is applied both to the individual motors on the run-out table and to the coils.

#### Exposition Is Instructive

ATEST equipment for use in steel plant operation, including some recently brought out, made an instructive display at the exposition held in

connection with the convention and attracted large attendance of steel plant engineers and others. The exhibits numbered about 60 and occupied all of one floor of the Cleveland Public Auditorium. The exhibit included a wide variety of apparatus used in the steel industry. There were numerous displays of electrical control equipment for all purposes, exhibits of open-hearth furnace control systems, working models of cranes, charging machines and other steel plant handling equipment, motors, cross-sections of soaking pits and heating furnaces, electric trucks and other equipment.

A new alternating-current transformer-type arc welder was shown by the General Electric Co. This is designed for welding heavy seams and joints and is claimed to produce welds of high quality in locations where the operation of a direct-current welding arc is adversely affected by magnetic influence. A heavily coated electrode has been brought out for use with this welder. A new automatic welding head for high production work also was shown by this company.

An interesting display of Timken tapered roller bearings included samples of every bearing used in the new continuous strip mill of the Ford Motor Co., which is said to be the first continuous rolling mill to be completely anti-frictionized. Over 600 heavy mill-type bearings, weighing 350,000 lb., are used in the Ford hot mill. A bearing with 42-in. bore and 68-in. outside diameter, which will be used on a cement grinding mill, was one of the exhibits. This is the largest bearing ever made in bore size and outside diameter but not the largest in capacity.

Some recent developments in Meehanite castings included a heat-treated and drawn brake drum having a Brinell hardness of 300 made for a heavy-duty crane, piston rings heat treated and drawn before machining, and bearings for trailer trucks and tenders of locomotives commonly made of cast steel.

New products included a scale-equipped welded steel trolley.

An unusual exhibit was a magnet for lifting stainless steel, aluminum, copper, brass and other non-magnetic metals. This is a laboratory development that has not yet reached the commercial stage.

#### Mill Engineers Keep Informed on Welding Progress

RECENT developments in the welding industry were discussed in two sessions of the welding engineering division, and the good attendance at these meetings, which included seven papers by engineers from all branches of the welding industry, indicate that

(Continued on Page 90)





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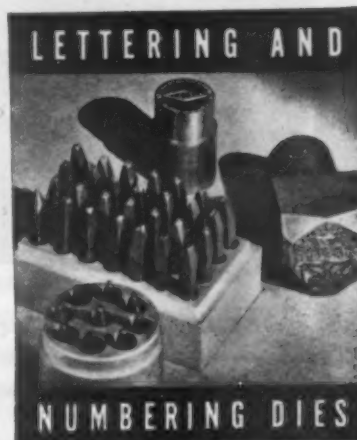
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Engineers - Manufacturers

1140 Ivanhoe Rd., Cleveland, O.

(Continued from Page 88)

steel plant engineers take considerable interest in the subject.

A summary of some of the advances in the art of welding and of development in welding equipment during the past year, by G. A. Hughes, electrical engineer, Truscon Steel Co., Youngstown, Ohio, was a feature of the first session. The mechanical method of the timing of welds in resistance welding did not always prove satisfactory, he said, and there are now two methods of accurately controlling with the electronic tube. This accurate control has broadened the field of spot welding. One automobile manufacturer is now flash welding 20 gage sheets 144-in. long for the back of a streamline automobile. Six welds are made simultaneously and a complete body is welded in 70 sec. Eighty lineal inches of flash welding is now being done on sheet steel as light as 24 gage. Current in flash welding has been stepped up from 40 to 60 kw., and as high as 125 kw. has been used.

### Developing Helium Arc Shield

Fabricators of tanks, pressure vessels and heavy plates, the speaker said, are showing interest in arc welding with alternating current. New shielded-arc electrodes now give a tensile strength of 65,000 to 75,000 lb. per sq. in., or more, and an elongation of 20 to 30 per cent in 2 in. In addition to resistance welding of stainless steel, progress has been made in arc welding with a helium shield around the arc.

Nitrogen in metallic arc weld metal was discussed by Dr. J. W. Miller, metallurgist, Reid-Avery Co., Dundalk, Md., who said that in the course of an investigation it was found that the nitrogen content of weld metal deposited by the metallic arc process might be diminished by increasing the carbon content of the electrode, increasing the amperage, decreasing the voltage, increasing the diameter of the electrode, decreasing the nitrogen content of the atmosphere and using heavily-coated electrodes. Whether annealed or unannealed welding rods are used makes no difference in the nitrogen content, the speaker said. Nitrogen affects the physical properties of the weld, but nitrogen alone will not account for all the inferior properties found in some metallic arc weld metal. Other factors such as heat treatment, grain size, micro-structure, carbon, manganese and oxygen content play an important part in controlling the physical properties, in the opinion of the author. He said, however, that nitrogen content is not a problem today when the average coated wire is being used.

In the discussion, H. M. Hobart, consulting engineer General Electric Co., pointed out that the tests had been made with low-carbon steel, and

suggested that similar tests should be made with stainless and other alloy steels that are more difficult to weld than mild steel.

Oxy-acetylene welding and cutting were discussed by W. S. Walker, Linde Air Products Co., Cleveland, who reviewed early applications as well as new developments in this field. Notable advances, he said, have been made in welding pipe. With new technique and using a small excess of acetylene the strength of welds has been increased and the production of welds has been speeded up. Pipe up to 26 in. in diameter is being oxy-acetylene welded. This welding method is also being used for aircraft parts and thin tubing.

Bronze welding, the speaker pointed out, is being used more extensively as a result of the development of a new bronze welding rod, which gives a strength of 56,000 to 60,000 lb. per sq. in. in welding steel, and is being used for repairing cylinder blocks, locomotive and other parts. It is also being used effectively for building-up worn surfaces. Corrosion-resisting iron and steel is now being successfully welded with bronze, using a special flux. Another growing application of oxy-acetylene welding is in the hard facing of wearing surfaces with Stellite and other alloys. The speaker mentioned a number of applications of hard facing intended to prolong the wearing surfaces of steel plant equipment.

A comparatively new development in oxy-acetylene cutting is flame machining for removing the surface from metal, a process which, the author said, is making rapid progress. The same torch is used as for cutting but with a different nozzle, providing a jet of low velocity and producing a scooping action on the metal similar to a chipping hammer. The flame method, it is claimed, is in many cases more economical than the chipping hammer in chipping semi-finished steel. Flame machining is also being used for operations similar to planing, milling, turning, and is applicable for drilling and boring, although it has not been commercially applied for the latter two operations. It can be used for precision cutting, taking a cut within 0.003 in. on a 1-in. plate and within 0.031 in. on a 6-in. plate. It is being used in tube mills for making a centering hole in billets for piercing.

### High Quality Aluminum Welds Obtainable

A paper on recent developments in the welding of aluminum alloys, presented by D. I. Bohn, electrical engineer Aluminum Company of America, Pittsburgh, attracted much interest. As these alloys differ so greatly from steel in their thermal and electrical properties, equipment and

(Continued on Page 92)



# THIS NEW SYNCHRO VALVE



Above is Bristol's new Synchro Valve. Diaphragm operated, V port balanced type. Diagram at right shows typical hysteresis test curve, with pressure on diaphragm plotted against valve stem travel, showing a definite valve position or opening for each pressure, regardless of whether pressures are rising or falling.

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AND SEE FOR YOURSELF**

When you are attending the Sixteenth National Metal Exposition, New York, Oct. 1 to 5, be sure to visit the Bristol Booth No. 362, and see the new Synchro-Valve, and the other equipment for complete automatic control that will be on display.

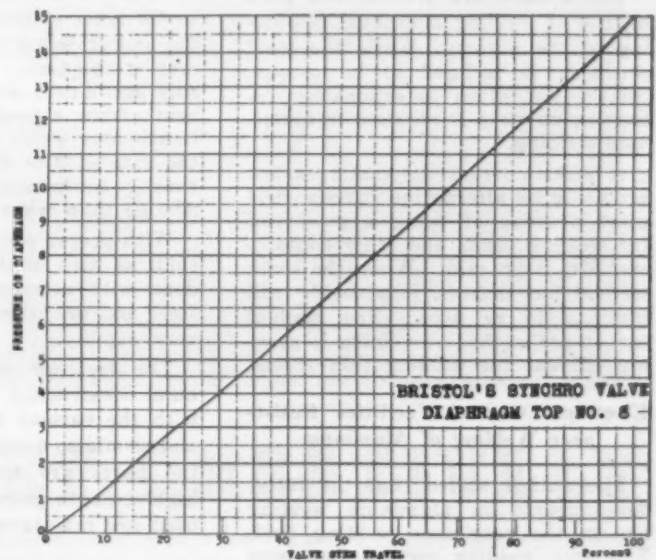
... provides valve opening consistent with diaphragm pressure. Instant response, no jumping

A pioneering contribution to the art of automatic control, Bristol's new Synchro Valve responds instantly to changes in air pressure on the diaphragm top. For a given pressure, the position of the valve stem is the same, regardless of whether pressures are rising or falling. There is no hysteresis, no friction loss, and no step by step or jumpy action during operation.

Improved Bristol construction simplifies maintenance and servicing. Stem packing can be renewed without disturbing adjustments; diaphragm or spring may be replaced without changing setting of spring follower.

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### NEW ENGLAND HIGH-CARBON WIRE CO.

MILLBURY, MASS.

(Continued from Page 90)

methods differ from those used in the welding of steel. Aluminum alloys, particularly high-strength alloys, obtain their physical properties from heat treatment and welds in these alloys remove some of these properties over a zone that has been heated above a certain temperature. A torch weld was said to affect a larger area than an arc weld, while with resistance welding the affected area is almost confined to the zone in which the fusion has taken place.

The metallic-arc process is a good method of welding aluminum, according to the author. While the weld produced is inclined to be porous, this is not often objectionable. A backing-up strip is required in aluminum welding.

A direct-current automatic carbon arc using an alternating current field gives promise of being a good tool for welding tanks and other containers, Mr. Bohn said. While the torch method has defects, it probably will continue to be used. The manual carbon-arc method of welding is proving efficient for welding thin sheets.

#### Electronic Control Facilities Resistance Welding of Aluminum

The author stated that the latest developments in aluminum welding are in the resistance welding field. The spot welding method has been followed for a number of years and is satisfactory for welding common alloys, but not for high-strength alloys. The high heat and electrical conductivity of aluminum give rise to some problems. Electrodes  $\frac{1}{8}$  in. in diameter are used. Variables that

must be considered in resistance welding of aluminum are surface design of electrodes, electrode pressure, amperes and timing. Pressure and timing are pre-set and the amperage is taken care of by bringing up the power to the point required.

In resistance welding of strong alloys nothing can take the place of electronic timing, the speaker said. Power requirements for resistance welding of aluminum are high. Seams over  $\frac{1}{8}$ -in. thick have been welded, requiring 50,000 amp. Electronic control is necessary, as intermittent power must be used in seam welding, the power being used about 25 per cent of the time. Seam-welded pressure containers and tanks are being made from strong aluminum alloys. Continuous welds are being made at the rate of 3 to 8 ft. per min. The timing equipment has to be more flexible than when welding steel.

With proper equipment, the speaker said, as high quality welding can be done with aluminum alloys as with steel and precision work can be done very rapidly.

The designer using welded aluminum construction must be familiar with the various methods of welding and should so design a unit that when the parts are welded together the high-strength properties of the alloys used are maintained.

#### Thermit Process Suitable Both for Repair and New Construction

Advantages of thermit welding for heavy repair work, as outlined in a paper on Thermit Welding—Economic Importance in Steel Mill Main-

tenance, by J. B. Tinnon, sales manager Metal & Thermit Corp., 120 Broadway, New York, include low cost and speed of repairs, as compared with the expense and time required in securing a replacement part, and also dependability.

A mill part, he said, could be repaired by thermit welding at from 20 to 50 per cent of the cost of a new part, the steel produced by thermit reaction having all the physical properties of high-grade steel forgings. Mr. Tinnon listed three uses of this type of welding in the steel plant, namely, the repair of broken parts, the building up of worn parts, such as rolls, pinions, etc., and the manufacture of new construction. Slides were shown illustrating a wide variety of thermit welding in steel plants. The steel may be produced of any desired hardness, the author said. Thermit welding departments in the mills are not limited to emergency repairs but can make various routine repairs for the salvaging of parts. One application of thermit welding is in making railroad crossings. In reply to a question Mr. Tinnon said that a crane runway rail could be thermit welded at a cost of \$7 or \$8.

Electric discharge tubes for resistance welding was the subject of a comprehensive technical paper by Dr. J. Slepian, Westinghouse Electric & Mfg. Co. In this the author described the Ignitron, a recently developed tube containing gas or vapor in which is applied a new method for starting a cathode spot, and he characterized this tube, which is of high-current capacity, as a highly efficient tube for use in connection with heavy current power circuits. A detailed description of the electronic control system used with the tube was given by A. M. Candy, welding engineer of the same company.

### Pattern Making Symposium Arranged by Foundrymen

MODERN pattern making practice will be reviewed at a symposium under the joint auspices of the wood industries division of the American Society of Mechanical Engineers and the American Foundrymen's Association, to be held at the Philadelphia Convention Hall, Wednesday, October 24, during the International Foundry Congress. Ira B. Turner, Thomas J. Hunter Co., Philadelphia, and president, Association of Manufacturing Pattern Makers of the Philadelphia district, will be the principal speaker, and Paul Bilhuber, Steinway & Sons, Long Island City, New York, will preside.

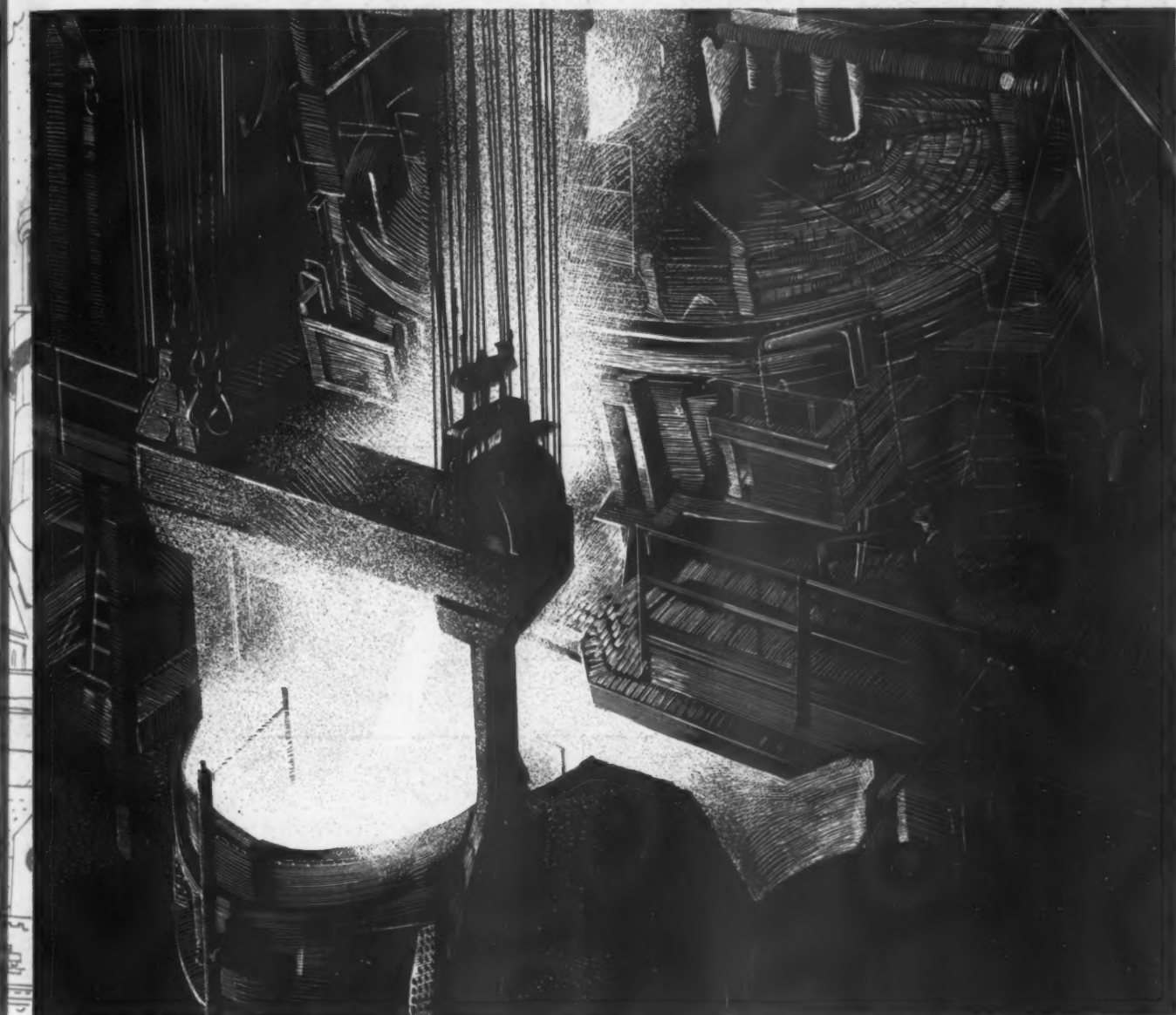


# THE IRON AGE

DUCTION -- MANAGEMENT

SEPTEMBER 27, 1934

PROCESSES -- NEWS



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Electrically, the "AAA" outlasts itself. Mechanically, millions of operations are built in. Solid silver shoes—not plating—are on the contacts—silver, that conducts electricity perfectly whether bright or oxidized, and that cannot "freeze" contacts together.

"AAA" contacts are double, cutting volt-

age rise in half, and splitting the arc to a harmless pin-point that is snuffed positively in deep Thermoplax pockets.

In laboratory or shop the "AAA" has not yet been improved upon; it uses the same basic magnet structure as heavy duty C-H steel mill controls. No parts replacement whatever, after years of daily use, is not unusual with this starter... Read the features listed on this page. They explain why so many buyers standardize on C-H, and why you should, on both new and existing machines. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1325 St. Paul Ave., Milwaukee, Wis.



# CUTLER HAMMER

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*In the 70's*



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In the days when American business, politics, investment, expansion, could be almost summed up in one word—"railroads"—Ludlum was a leading manufacturer of fine steel railroad car springs. These springs were used by all the great Eastern roads—Pennsylvania, New York Central and Hudson River, Boston and Maine, etc., and even the Wagner Palace Car Company.

In 1934, travelers on land, water, or air are still served by Ludlum, and in many ways. Directly, Silcrome steel in the valves of your car brings such complete freedom from valve troubles that motorists scarcely know what a valve is. Indirectly, Ludlum service extends throughout industry where special alloy tool steels and Nitralloy help to make possible production methods that constantly reduce unit costs.

Applications requiring extreme heat resistance, such as exhaust valves or the perforated cylinders of range oil burners and oil-burning heaters, find the answer to the steel problem in a special Silcrome analysis. Applications exposed to weather or chemical corrosion likewise find that Silcrome solves the problem. There are even grades of Silcrome to meet such special production requirements as free machinability and ease in working. The trade-mark Silcrome on all grades of Ludlum Stainless Steel is assurance that the steel was melted by Ludlum and processed under the most modern technical control.

A staff of skilled engineers is continually at work, developing new uses of Silcrome. Their services are yours to command . . . Address Research Department, Ludlum Steel Company, Watervliet, New York.



LUDLUM STEEL COMPANY • WATERVLIET • NEW YORK

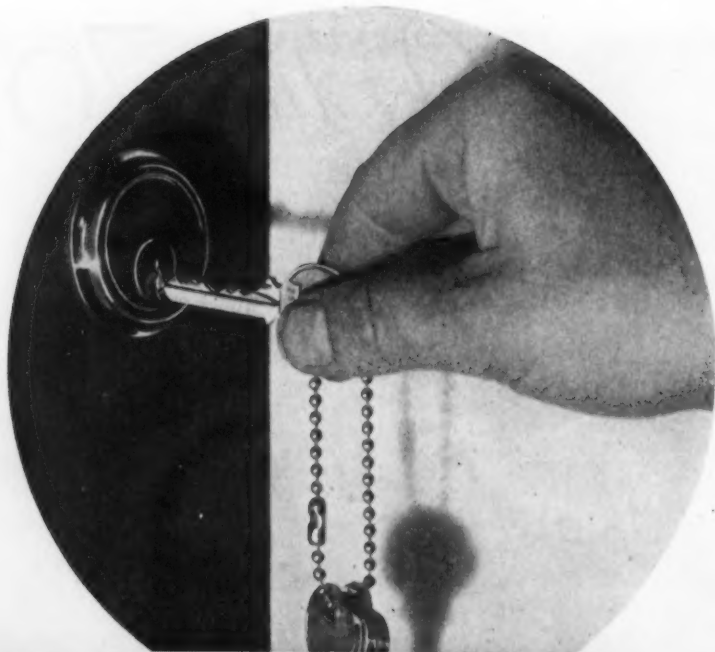
*Tool Steels • Silcrome • Nitralloy*



# LUDLUM



MAKERS OF FINE STEELS SINCE 1854



# RIVERSIDE

FREE-MACHINING

## NICKEL SILVER

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*The* Qualities Which Make  
It Ideal for the Manufacture of Keys May Be  
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Very little consideration is given to those things which provide trouble-free performance day after day and year after year. Once recognized, their reliability is taken as a matter of course, and in time becomes commonplace. The keys you carry are an example. It is difficult to imagine anything more universally used, more implicitly depended upon, and yet expected to stand up under regular, hard service. They must be rust and corrosion proof, resist the abrasive action of countless insertions and withdrawals, wear resisting to retain the finely milled accuracy of contour and groove, strong enough to stand the torsional strain applied each time the lock tumblers are thrown, and generally to withstand the variety of atmospheric and other conditions encountered in daily use.

Such severe service presents a challenge to the metal from which keys are produced. In addition, the key manufacturers' fabrication requirements must also be met. The key stock must be freely machinable, capable of taking and retaining fine and accurately milled forms, rolled to extreme flatness and close gauge tolerances, hard enough

to stand abuse, yet soft enough to permit sharp, clear embossing, and of a clear-through color which will attain a high luster under buffing without plating.

RIVERSIDE Nickel Silver Key Stock is furnished in a number of accurately controlled alloys which combine the essential qualities of free machinability and great strength. Thus, Riverside Nickel Silver Key Stock meets every performance and fabrication requirement which its use indicates. The characteristics which are responsible for the large consumption of RIVERSIDE Nickel Silver in the key manufacturing industry recommend it for the manufacture of screw machine products, drafting instruments, orthopedic, surgical and dental appliances, hardware, fishing equipment, musical instruments, and other appliances where a strong, free machining, corrosion and wear resisting white metal is desirable.

The Riverside Metal Company specializes in the production of wrought Nickel Silver, Phosphor Bronze and Beryllium Copper. Samples of and booklets on our metals are available to manufacturers.



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## Why Not Check Over the Parts in Your Product?

- \* Decide for yourself whether each part is made of the material best suited to insure maximum efficiency in operation and the greatest economy in manufacture.
- \* Decide for yourself whether you can take advantage of the comparatively recent improvements in the technique of die casting.

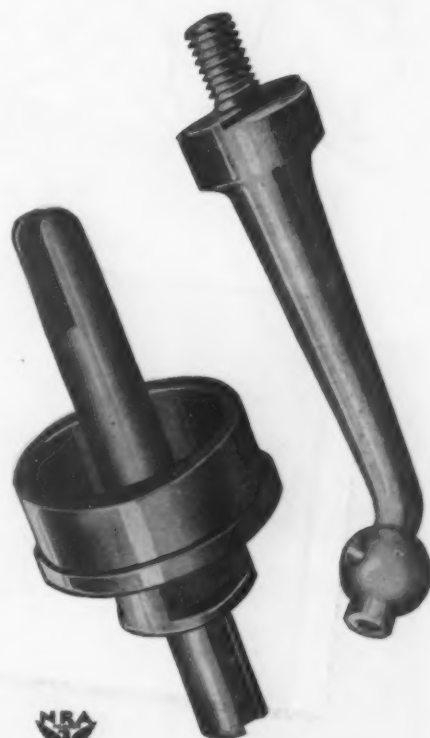


# ALUMINUM BRONZE STRONGER-THAN-STEEL DIE CASTINGS

have been selected by leading manufacturers for many parts of their products because they fulfill present-day requirements in operation and because they cut to a minimum the amount of machining necessary on the types of parts for which they are especially adapted.

STRONGER-THAN-STEEL Die Castings possess a valuable combination of properties—superior strength (in excess of 80,000 lb. per square inch), high corrosion resistance, excellent wearing qualities, complete assurance of clean sound castings, and an accuracy as cast which in general exceeds one half of one percent of the linear dimensions. This accuracy readily explains why it is so often possible to save money on machining costs.

In checking over the parts in your product, you may find, as other well-known manufacturers have already done, that you can advantageously redesign one or more of your parts as STRONGER-THAN-STEEL Die Castings. You will find our engineering department, with its extensive experience, ready to cooperate. Just send us drawings or samples. And our latest Bulletin No. 4 contains much helpful information. It's yours for the asking.



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Incorporated

616 West Park Avenue

Aurora, Illinois, U. S. A.

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## See Our Exhibit

at the National Metal Exposition  
New York City, Oct. 1st to 5th—Booth No. 431

# A GOOD TWO SOME

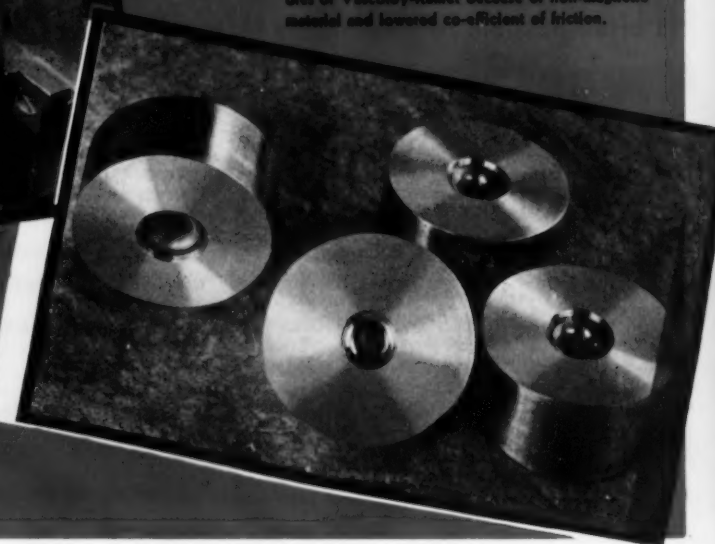


## VASCOLOY -RAMET



Machining Steel Casting. Note particularly that Vascoloy-Ramet withstands intermittent cutting.

Power consumption is lowered with wire drawing dies of Vascoloy-Ramet because of non-magnetic material and lowered co-efficient of friction.



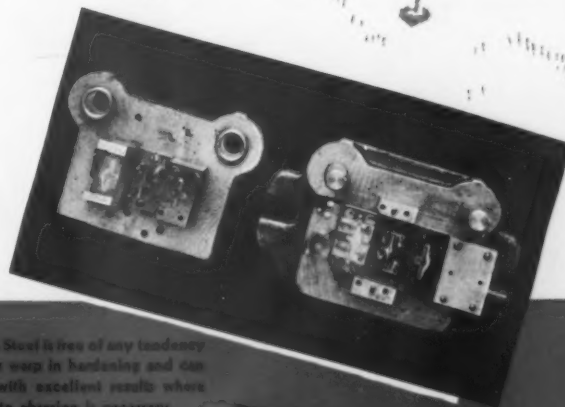
# VANADIUM-

ALLOYS STEEL CO., LATROBE, PA.

(All orders and inquiries should be directed to Vanadium-Alloys Steel Company, 1440 W. Randolph Street, Chicago, Ill.)



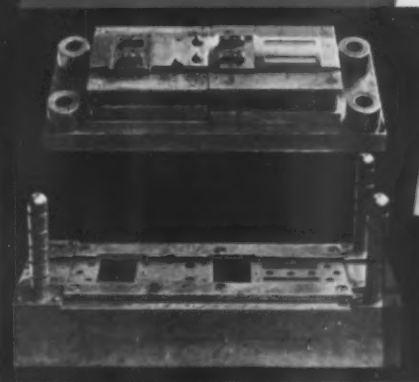
# A MIXED FOURSOME



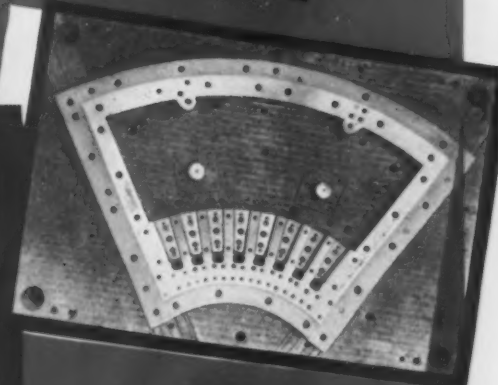
Crocar Die Steel is free of any tendency to move or warp in hardening and can be used with excellent results where resistance to abrasion is necessary.



Colonial Six, oil hardening steel is known for its non-changing and non-warping characteristic and is especially recommended for tools and dies of such construction as do not admit grinding to shape after heat treatment.



Red Star Tool is an exceptionally good general purpose steel because of its uniformity, reliability and wide range of usefulness.

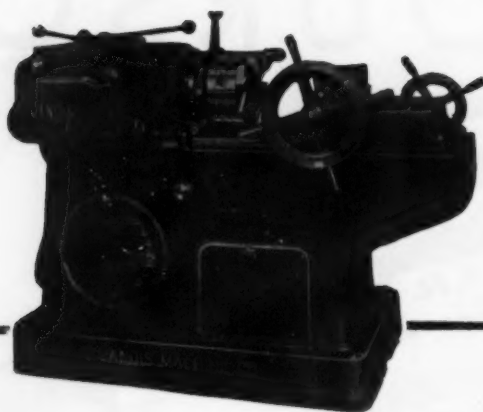


Red Cat Superior, "the nationally known High Speed Steel" is noted for its uniformity. This is accomplished by producing each bar under identical mill conditions.

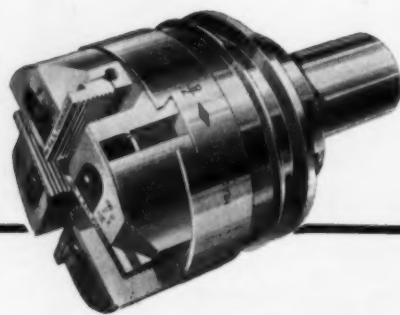
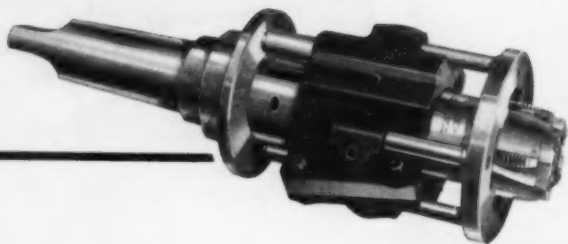
# COLONIAL

STEEL CO., PITTSBURGH, PA.

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These new tools are designed to meet today's production conditions. They are faster and more reliable in operation, more accurate, and more economical.

Write today—and we'll tell you what the new LANDIS equipment will do on your work.

### LANDIS MACHINE CO., INC.

Waynesboro, Penna.



# **Towers of Progress**

RISING as sentinels at the entrance to the Golden Gate are the towers of the bridge which brings new fame to the Pacific Coast.

This bridge is emblematic of the progress of the Coast in the age of steel. A progress reflected not alone in the industrial growth of Los Angeles, the activity of San Francisco, the vigor of Portland, Tacoma, and Seattle, but throughout the ribbon of empire which is the western border of the nation.

Thousands of tons of steel are being provided for the Golden Gate Bridge by the Pacific Coast Steel Corporation. We are supplying quantities of steel for the vast material advance of the Coast area: Reinforcing bars, sheared plates, boiler plates, rails. Sheets of every type. Wire, nails, fence, P. C. bolts and nuts. Tin plate, bars, sheet piling, a full line of structural shapes and equipment for gold mining. Whatever and wherever the need for steel, we serve the Coast.



**Pacific Coast Steel  
Corporation**

*Subsidiary of Bethlehem Steel Corporation*





# Pacific Coast Steel Corporation

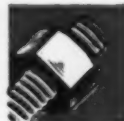


SUBSIDIARY OF BETHLEHEM STEEL CORPORATION

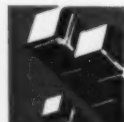
Mills and warehouses to meet the requirements of every Pacific Coast activity in which Steel is used



**STEEL PIPE**—Care at every step of manufacture, the use of high-grade raw materials, repeated critical tests and inspections, insure Steel Pipe of uniformly high quality. Made in sizes from  $\frac{1}{8}$  in. to 16 in., Black and galvanized; standard, extra-strong, and double extra-strong.



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**REINFORCING BARS**—A complete line of steel reinforcing bars for highway building and other construction. These bars have the required strength and elasticity, with uniform section, and evenly-spaced deformations. Bars are furnished plain, deformed and special, in squares and rounds.



**ALLOY STEELS**—Every day sees the wider use of alloy steels for parts requiring exceptional strength and endurance. The facilities and broad metallurgical experience of Bethlehem Steel Company, insuring alloy steels of highest quality, are available to you through Pacific Coast Steel Corporation.



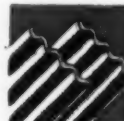
**HOLLOW DRILL STEEL**—Because of its "end-to-end" heat treatment and smooth bore, which prevents fatigue from getting a foothold, this hollow drill steel is virtually immune to fatigue. Made in Bethlehem Steel Company's Tool Steel Plant, where quality tool steels for every purpose are manufactured.



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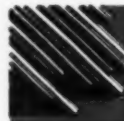
**STRUCTURAL SHAPES**—Steel for every structural requirement, from 36-inch I-beams for single span bridges, down to the lightest angle bar. And a complete line of lighter sections, which architects and contractors are finding ideally suited for use in all types of light-occupancy structures.



**SHEETS**—All kinds of Sheets: Galvanized, Flat and Formed Sheets, Sheets of Beth-Cu-Loy (copper-bearing steel) for use wherever rust-resistance is important. Hot-rolled, hot-rolled annealed, cold-rolled sheets. Blue-annealed and special-finish sheets. Furniture and automobile sheets.



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**STEEL PLATES**—Sheared and Universal Plates, in all grades, from tank plate up to special alloy-steel plates for high-pressure boilers and oil-refinery vessels. And Flanged Products, including tank heads, boiler heads, manheads, yokes, and miscellaneous flanged-plate work.



**NAILS**—All types of Wire Nails, including bright, annealed, cement-coated, blued and galvanized. Made from selected steel wire, drawn true to size. You can depend on these nails for strength, holding power, resistance to corrosion and driving qualities.



**WIRE**—Drawn from carefully prepared stock, and uniform in size and quality. Plain wire and galvanized wire. Bethanized Wire (special zinc-coated). Bright-processed, annealed, normalized heading and telephone wire; spring wire; barbed wire. Woven-wire field and poultry fence.

## OTHER PRODUCTS HANDLED BY PACIFIC COAST STEEL CORPORATION INCLUDE

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SPECIAL ROLLED SECTIONS  
SEMI-FINISHED STEEL  
PIG IRON  
FORGINGS

CASTINGS  
WROUGHT STEEL  
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FOR STEAM AND INDUSTRIAL RAILWAYS

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### PRECISION BEARINGS

#### FOR EVERY LOAD, SPEED AND DUTY

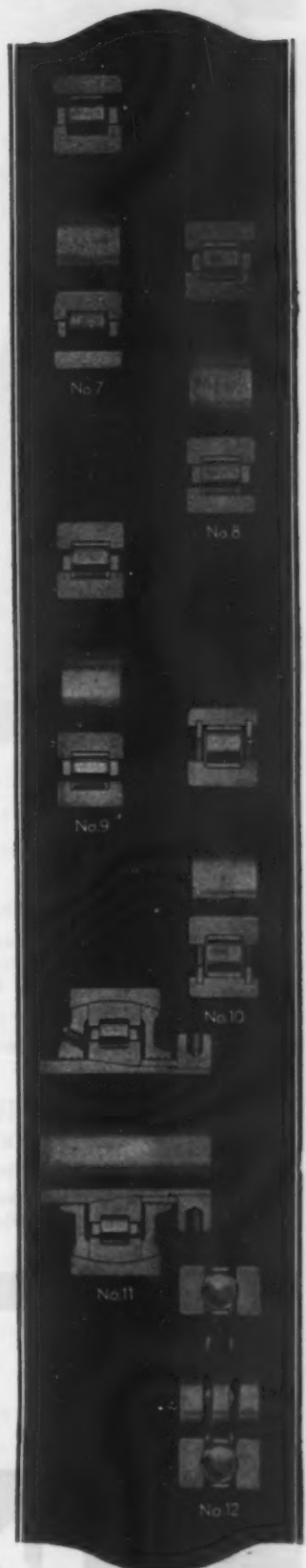
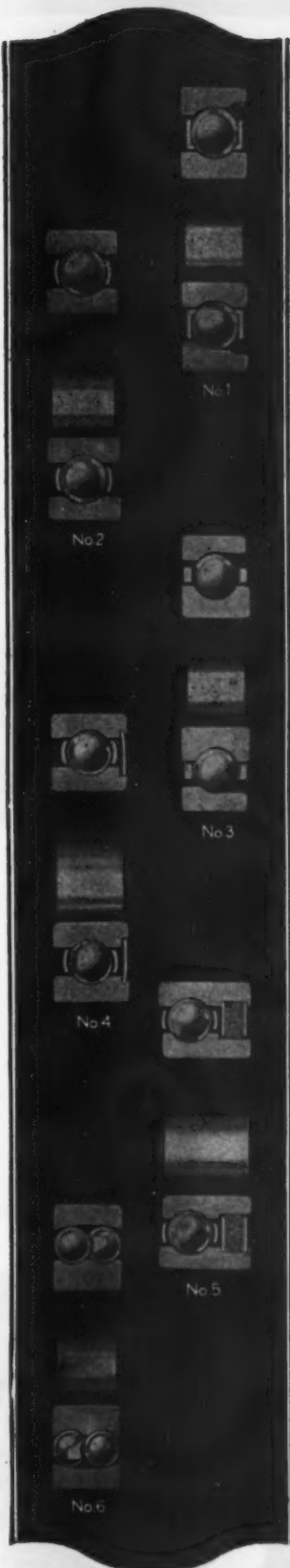
No one type of bearing is so versatile in its operating characteristics that it will meet all conditions; conditions should determine the type of bearing used. From the comprehensive **Norma-Hoffmann** line—here illustrated in part and briefly indexed—a **Precision** Bearing, or several in combination, can be chosen that will be exactly right for the duty. Let our engineers, with their specialized experience, work with you in selecting and applying bearings that will lower your production costs. Write for the Catalog.

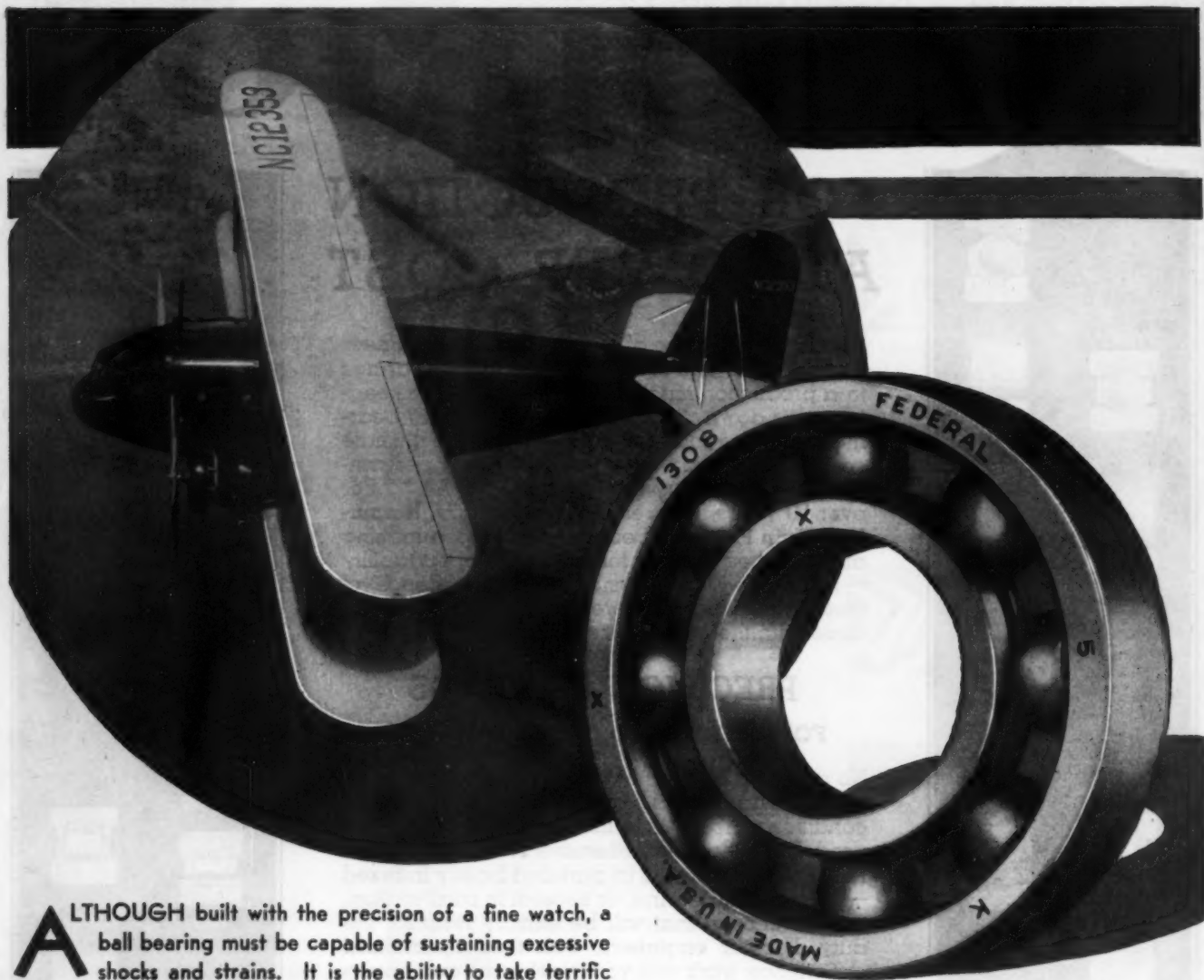
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| 1—Open (separable) type ball bearing.  | 7—Standard cylindrical roller bearing.  |
| 2—Closed radial type ball bearing.   | 8—One-lipped cylindrical roller bearing.  |
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| 4—Single-plate, grease-retaining, dirt-excluding ball bearing; available in double-plate type also.                | 10—Full-type (retaining ring) cylindrical roller bearing.   |
| 5—"7000" Series "Greaseal" felt-protected ball bearing; also available with double felt seal, and with side plate. | 11—Self-aligning adapter type cylindrical roller bearing with grease-retaining, dust- and moisture-excluding side plates. |
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In addition to a thoroughly practical Technical Program which can readily be adapted to your daily work, there will be a Short Course on TOOL STEELS conducted by James P. Gill, B.S., M.S., Met. Eng., Chief Metallurgist of Vanadium Alloy Steel Co. Mr. Gill, one of America's foremost experts on carbon, low alloy and high speed tool steels, is eminently qualified to present this general survey of commercial tool steels. Write today for Enrollment Card!

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Meet your friends in Republic's Exhibit where you can spend waiting time to good advantage. You are always welcome.

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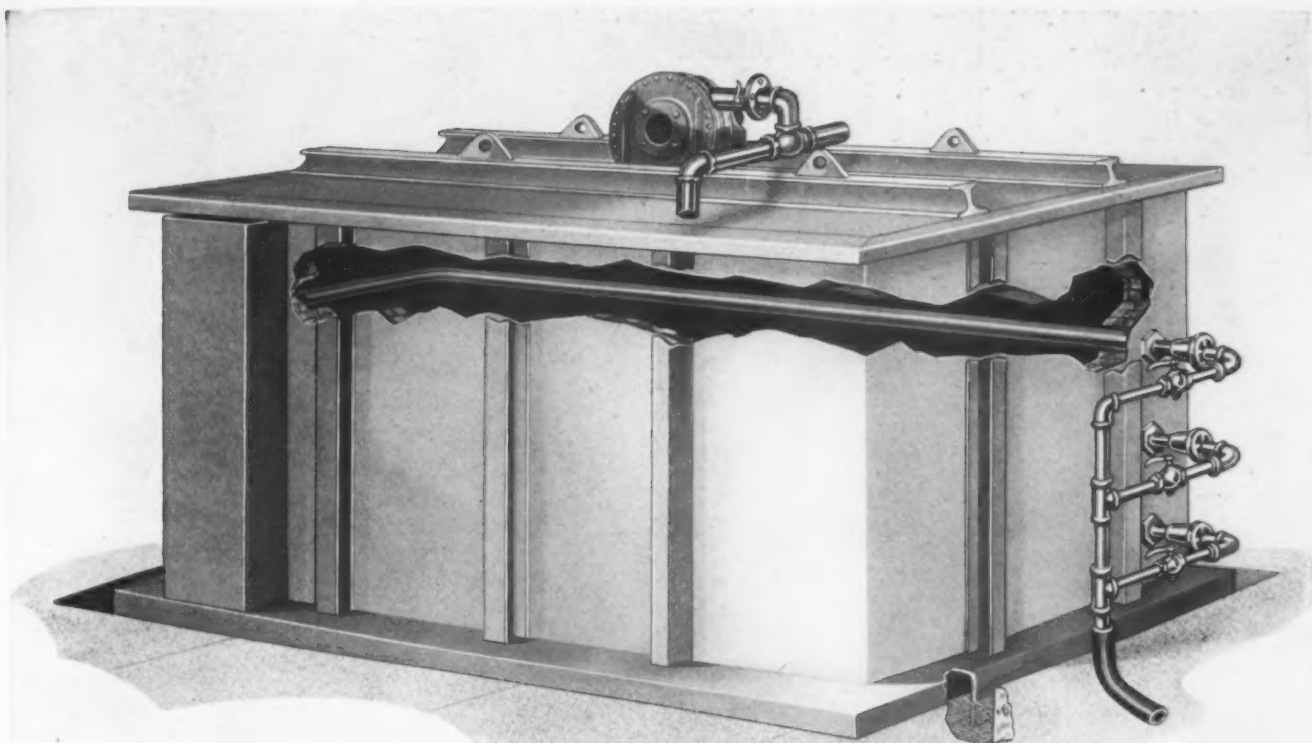


### REPUBLIC STEEL CORPORATION

GENERAL OFFICES: YOUNGSTOWN, OHIO







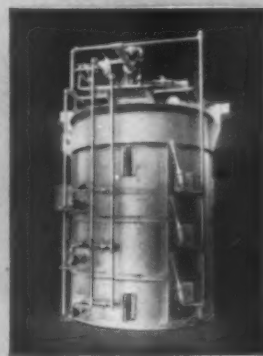
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*Eliminates use of heavy boxes and bases in the annealing of sheets. Fuel consumption and annealing time are greatly reduced due to heating the charge only . . . . There is no dead weight to heat.*

Salient features of SC Radiant Annealing Cover:

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3. Heating elements operate under negative pressure.

*SC Radiant Tube Annealing Covers can be furnished in standard sizes, in either rectangular or circular types.*

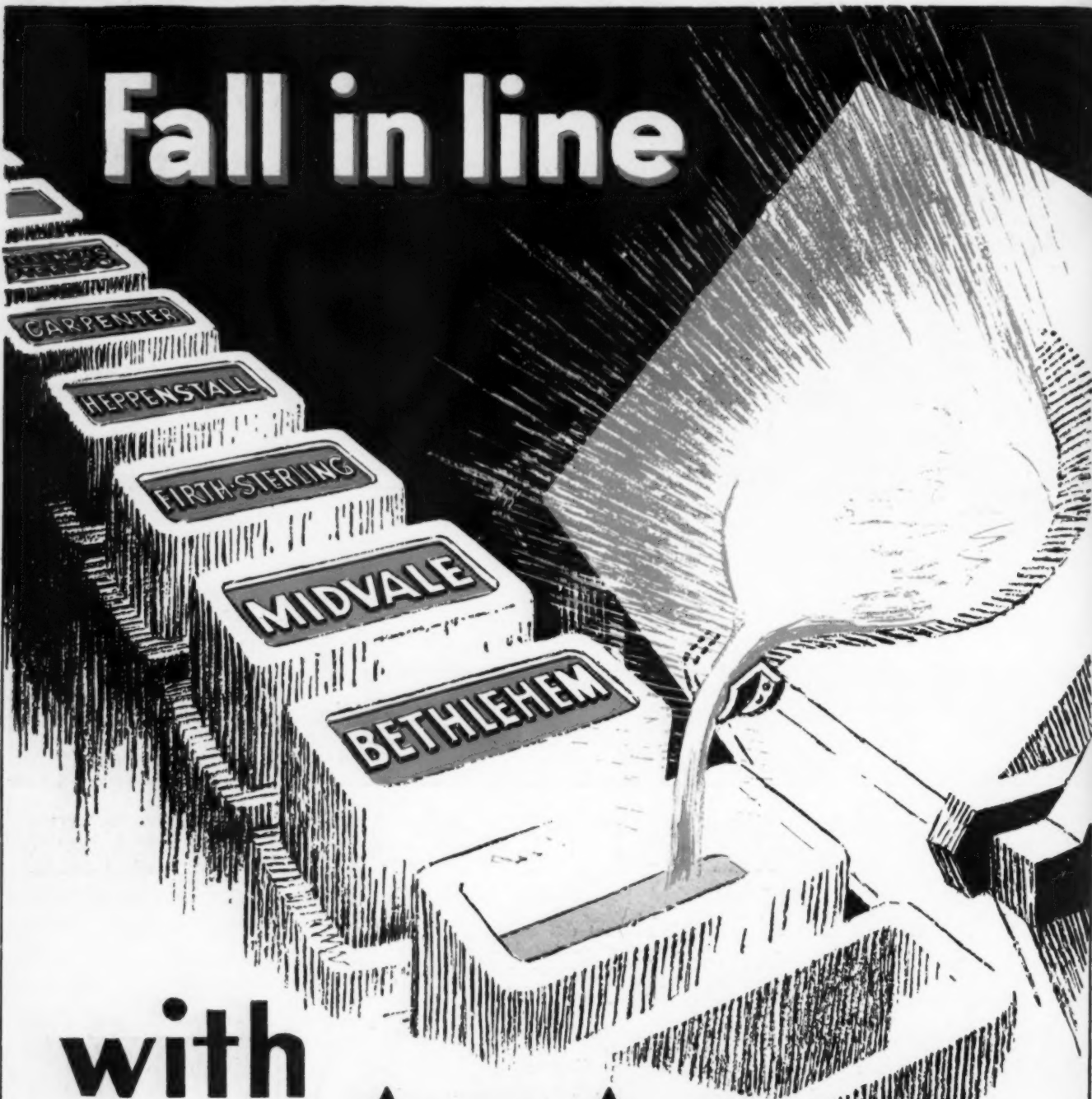


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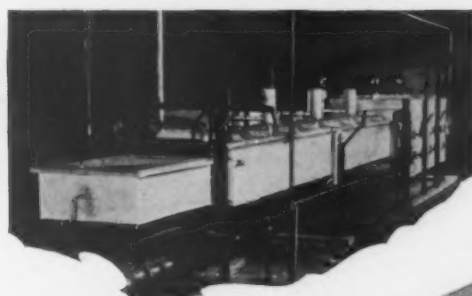
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National Metal Exposition  
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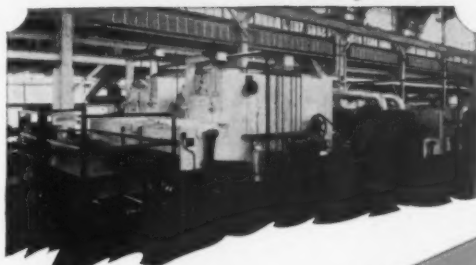




**BRIGHT ANNEALING TUBING**  
—Copper tubing in coils up to 30 in. diameter and straight lengths up to 35 ft. bright annealed in above furnace.



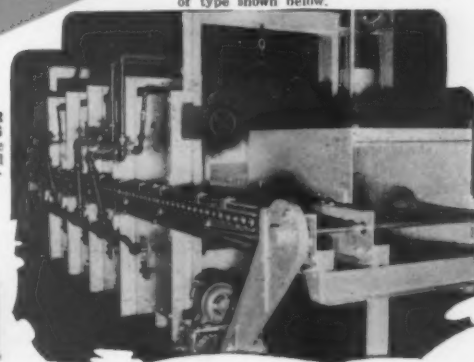
**BRIGHT ANNEALING WIRE**—Continuous, pusher type furnace bright annealing fine copper wire on spools.



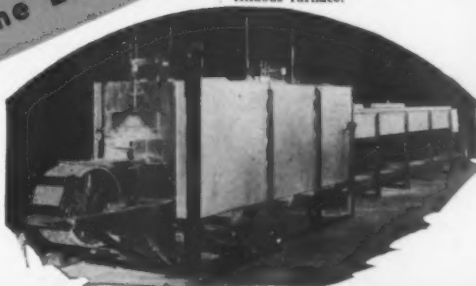
**SCALE FREE HARDENING**—Controlled atmosphere furnaces of the continuous types shown for treating miscellaneous products.

**Bright Annealing, Scale-Free Hardening, Brazing, Etc.**  
Continuous Controlled Atmosphere Furnaces for  
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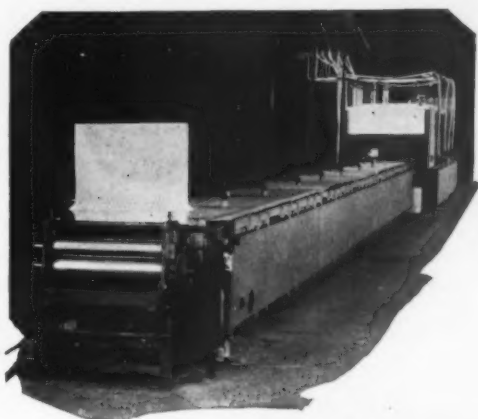
**ANNEALING STAMPINGS**—Ferrous and non-ferrous stampings, in various shapes, annealed in continuous roller hearth furnaces of type shown below.



**COPPER BRAZING**  
—The most intricate assemblies are neatly and cheaply joined in this continuous furnace.



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—Cold rolled steel strip bright annealed in the continuous controlled atmosphere furnace shown below.



**ANNEALING BRASS WIRE**—Gas fired continuous furnace annealing brass and bronze wire in coils.



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**Put Your Problems Up to Our Experienced Engineers**

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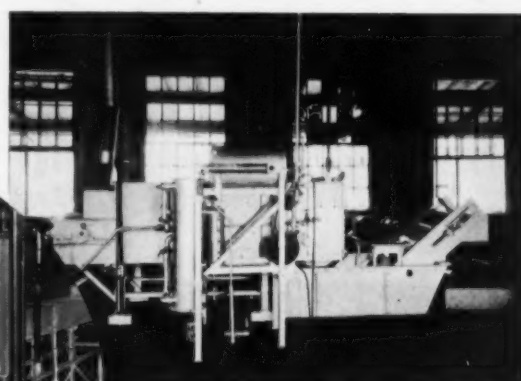
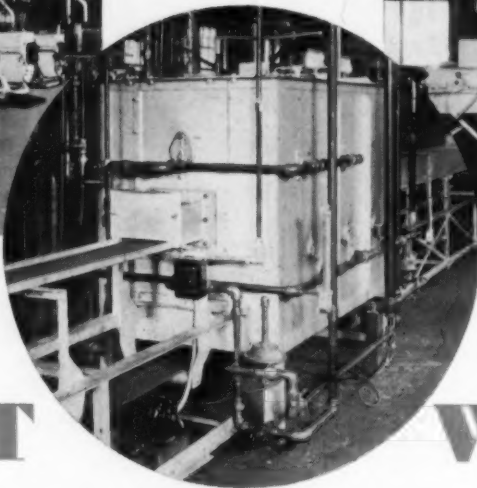
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*Coming to*  
**NEXT**

*New York*  
**WEEK?**

● We hope you are coming to the National Metal Exposition. To help make your visit comfortable as well as instructive we extend to you a cordial invitation to visit our office at New York. ● Come and see us even though you have no pressing furnace problem at this time. We have hundreds of new furnace designs and many new ideas which will interest you. So when you get tired at the show, drop in at 50 Church St. for a bit of relaxation. You'll find it worthwhile. ● Pass the good word around to other members of your organization who are planning to take in the Exposition.

**W.S. ROCKWELL CO., 50 Church St., New York**

REPRESENTATIVES: DETROIT — CHICAGO — CLEVELAND — COLUMBUS — INDIANAPOLIS — MONTREAL — TORONTO



# Lower in price,

## COMPARATIVE OPERATING DATA

	FIREBRICK LINING	B&W IFB LINING	SAVING
Time from lighting until ready for work . . .	60 min.	10 min.	83.3%
Fuel consumed during this period . . . . .	1,250 cu. ft.	200 cu. ft.	84.0%
Fuel consumed during operation . . . . .	10,105 cu. ft.	8,694 cu. ft.	14.0%
Amount of stock per square foot of hearth . .	53.7 lb.	83.4 lb.	55.3%
Total weight of stock heated . . . . .	1,610 lb.	2,496 lb.	55.0%
Gas consumed per pound of stock heated, including heating-up . . . . .	7.5 cu. ft.	3.57 cu. ft.	52.4%

yet



# too, will save 50% of your industrial furnace operating costs daily

The remarkable reductions in operating costs that have been secured through the installation of B&W Insulating Firebrick are now extended to those operating industrial furnaces in the lower temperature zones at a new low initial cost through the development of the B&W K-26.

This new insulating firebrick is substantially lower in price than the original B&W Insulating Firebrick, yet retains every characteristic requisite to lower operating costs in industrial furnaces operating at temperatures under 2600 degrees fahrenheit.

For service at higher temperatures, The Babcock & Wilcox Company has perfected the B&W K-30, which attains its maximum use limit at 3000 degrees

fahrenheit. Both of these insulating firebrick not only possess every advantage of an efficient insulator, but, due to their high fusion points, freedom from shrinkage, and inherent ability to support loads, may be used as a refractory in the furnace structure directly exposed to heat, thereby decreasing the heat storage as well as the heat flow.

These features result in time and fuel savings sufficient to warrant your thorough investigation. Write for Service Reports . . . even the briefest examination of these records will prove the adaptability of these refractories to your particular requirements and will indicate the amount of savings you, too, may secure.

SEE THE CONVINCING DEMONSTRATION OF SAVINGS AT

## BABCOCK & WILCOX

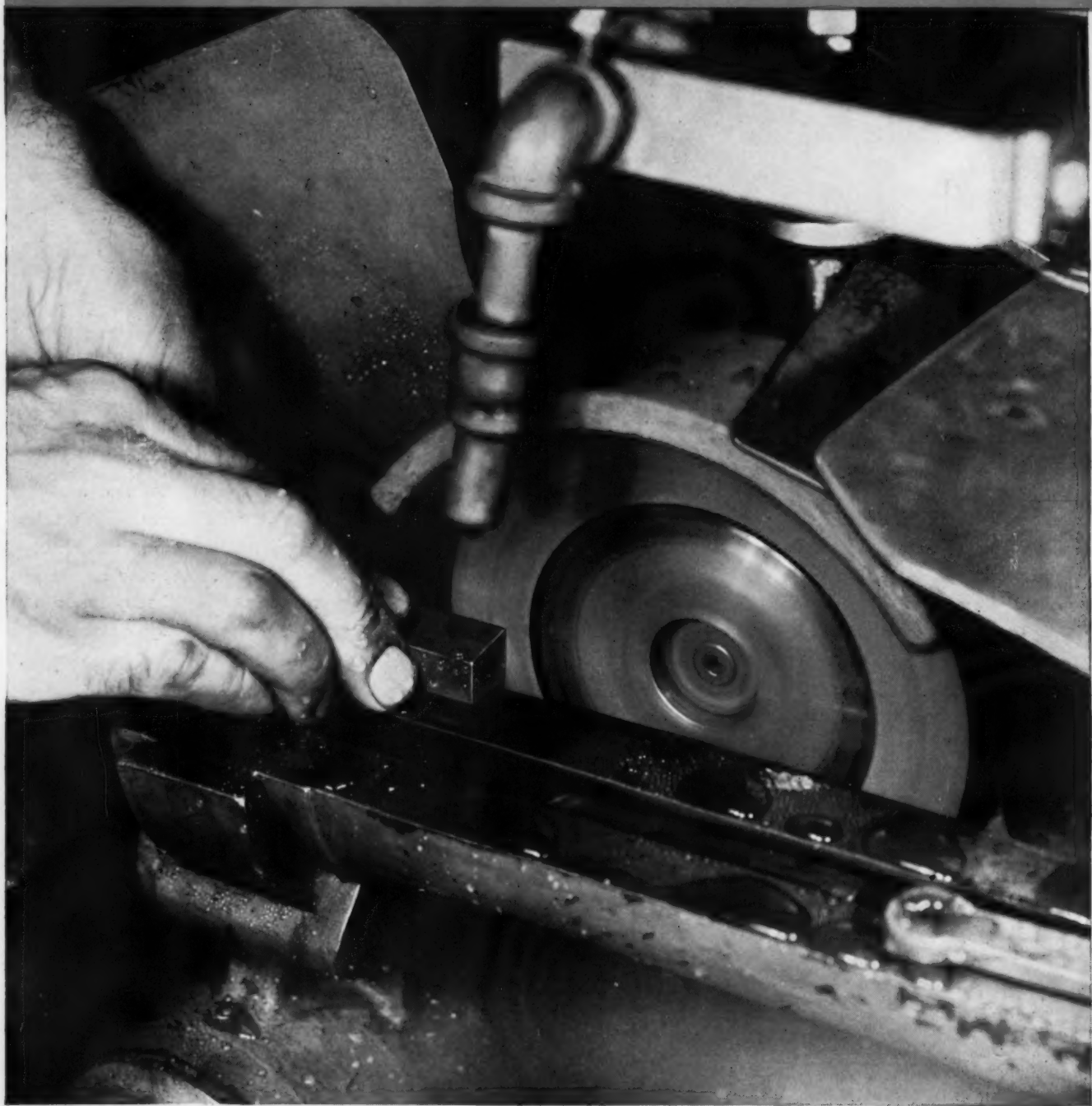
The Babcock & Wilcox Company, 85 Liberty St., New York, N. Y.

R-23



# ANNOUNCING

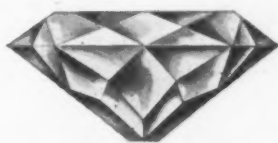
*A sensational New Wheel*



**THE NEW DIAMOND WHEEL WILL BE SHOWN and demonstrated under actual grinding conditions at The Carborundum Exhibit, National Metal Congress, October 1st-5th.**



# *for shaping and conditioning hard cemented carbide tools*



## **IT'S MADE OF CRUSHED DIAMONDS!**

**C**ARBORUNDUM Research Laboratories announce a new wheel made from genuine, crushed South African Diamonds—a wheel that through long exhaustive tests has shown startling results in grinding hard cemented carbides.

On pure cemented carbides this new wheel is approximately thirteen times faster cutting—removes thirteen times more stock per minute than previous specially developed abrasive wheels.

In the grinding of mounted tips—that is grinding the cemented carbide as well as the steel tool stock—the new Diamond Wheel shows four times greater stock removal per minute.

The diamonds used are small South African gems too small and off-colored to be considered precious. They are crushed—accurately graded to comparatively coarse, 90 grit; the fine, 220 grit; and extra fine, 400 grit—and bonded with a special bond developed in our laboratories. The result is a wheel that cuts with astonishing speed.

The new Diamond Wheels require no dressing—in fact, it is impossible to dress them. The thousands of

tiny diamonds that stand out like so many miniature cutting tools do not break down or crush. They stay permanently sharp precluding the need of dressing—even if it could be done.

These wheels are made to micrometer exactness—balanced to within a fraction of a gram. The new wheel is used with water—wet grinding—and it produces clean, true, straight, un-nicked edges and truly flat tool faces—beautifully finished. Overheating is eliminated—in grinding, the tools aren't even uncomfortably warm.

It is important to note, that by finishing with the fine grit wheel, the long, tedious, costly operation of lapping is eliminated.

Indications are that the Diamond Wheel can be effectively used also in many and various fields on materials approaching in hardness the cemented carbides. Studies of these applications are now being made.

Limited stocks are now available in six and seven inch diameter wheels in three grits.

Again Carborundum makes an important contribution to industry.

**THE  
CARBORUNDUM  
REG. U. S. PAT. OFF.  
COMPANY  
Niagara Falls, N. Y.**

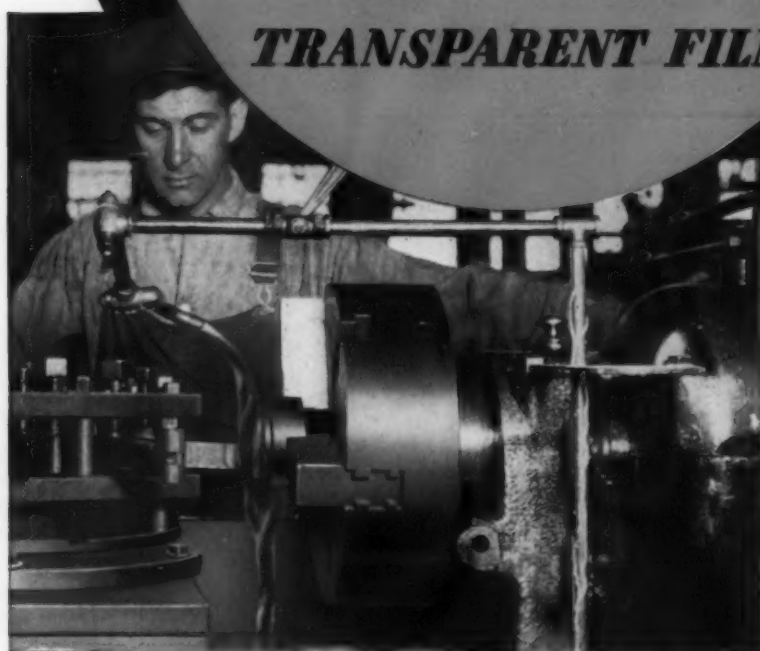
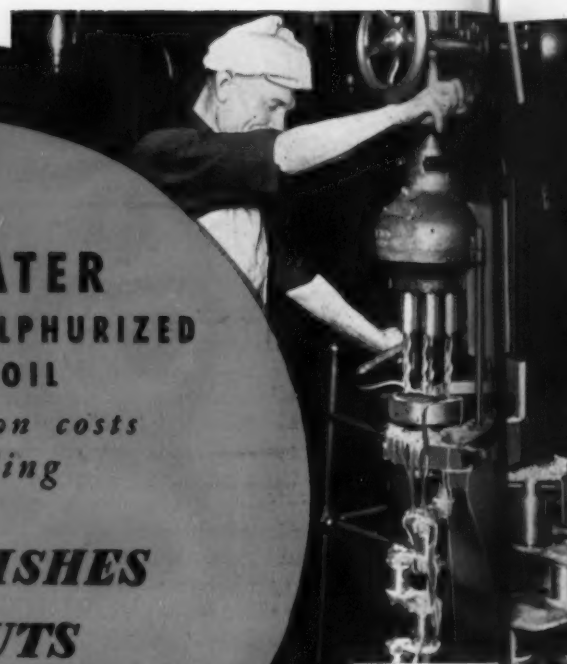
Canadian Carborundum Co., Ltd., Niagara Falls, Ont. Sales Offices and Warehouses in New York, Chicago, Boston, Philadelphia, Cleveland, Detroit, Cincinnati, Pittsburgh, Milwaukee, Grand Rapids; Toronto, Ont. (Carborundum is a registered trade-mark of The Carborundum Co.)

**HERE'S****Proof**

**TIDE WATER  
TRANSPARENT SULPHURIZED  
CUTTING OIL**

*cuts production costs  
by providing*

***FINER FINISHES  
MORE CUTS  
TRANSPARENT FILM***





# OF CUTTING SUPERIORITY

*which*

## **LOWERS PRODUCTION COSTS**



Increase the useful life of a cutting tool and production costs are immediately decreased. Add to this the assurance of finer finishes and you still further decrease production costs. Both these qualities are now obtainable to a degree which is worthy of serious consideration by every production executive. Tide Water Transparent Sulphurized Cutting Oil is the answer. Here's why.

Tested against 8 leading competitive brands bought in the open market, Tide Water's improved product resulted in 75% greater tool life over the average of the eight oils tested. In quality of finish Tide Water Transparent Sulphurized Cutting Oil outdistanced its leading competitors. And as its name signifies the oil is transparent — an added feature worthy of consideration.

Let us prove to you what this cutting oil can save in your production line. The coupon is for your convenience.

### **TIDE WATER OIL COMPANY**

17 Battery Place • New York, N. Y.



**TIDE**

**WATER**

#### **LUBRICANTS AND FUELS**

Compressor Oils • Cutting Oils • Transformer Oils  
Roll Neck Greases • Gear Greases • Fuel Oils  
Hydraulic Turbine Oils • High Pressure Greases  
Ball and Roller Bearing Greases • Steam Cylinder Oils

#### **C O U P O N**

TIDE WATER OIL COMPANY  
17 Battery Place, New York, N. Y.

Gentlemen: Please send me complete information concerning Tide Water's Cutting Oils.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

## SEE WHAT OTHERS ARE WITH J & L

Fifteen exhibits, representing as many different lines of Jones & Laughlin products, are presented in the J&L space at the National Metal Exposition. Most of them include parts made by J&L customers. The J&L representatives in attendance will welcome the opportunity to discuss with you the uses of the various J&L steel products on display.

# JALCASE

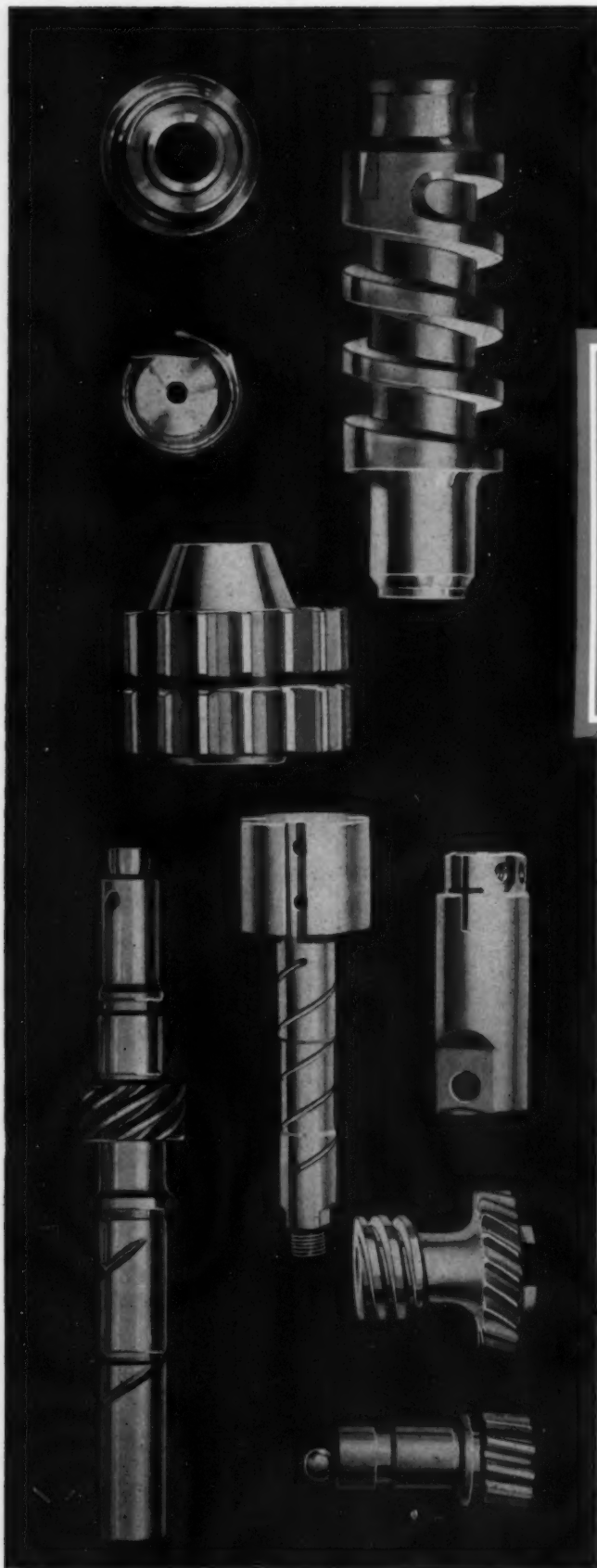
## HOT ROLLED COLD FINISHED

.10/20 CARBON .25/35 CARBON .30/40 CARBON

At the left are a few of the many parts that will be displayed in the J&L space to show the purposes for which different manufacturers are using Jalcas steel. Most of the samples are parts made of .10/20 carbon Jalcas, which combines superior free cutting qualities with especially desirable case carburizing properties. Other parts show how J&L customers are using higher carbon grades of Jalcas, which have heat treating properties that have led in many instances to the substitution of Jalcas for more expensive alloy steels. There are fifty pieces, including test specimens, in this display.

**J&L  
STEEL**

**JONES**





# ACCOMPLISHING STEEL PRODUCTS

SPACE 174

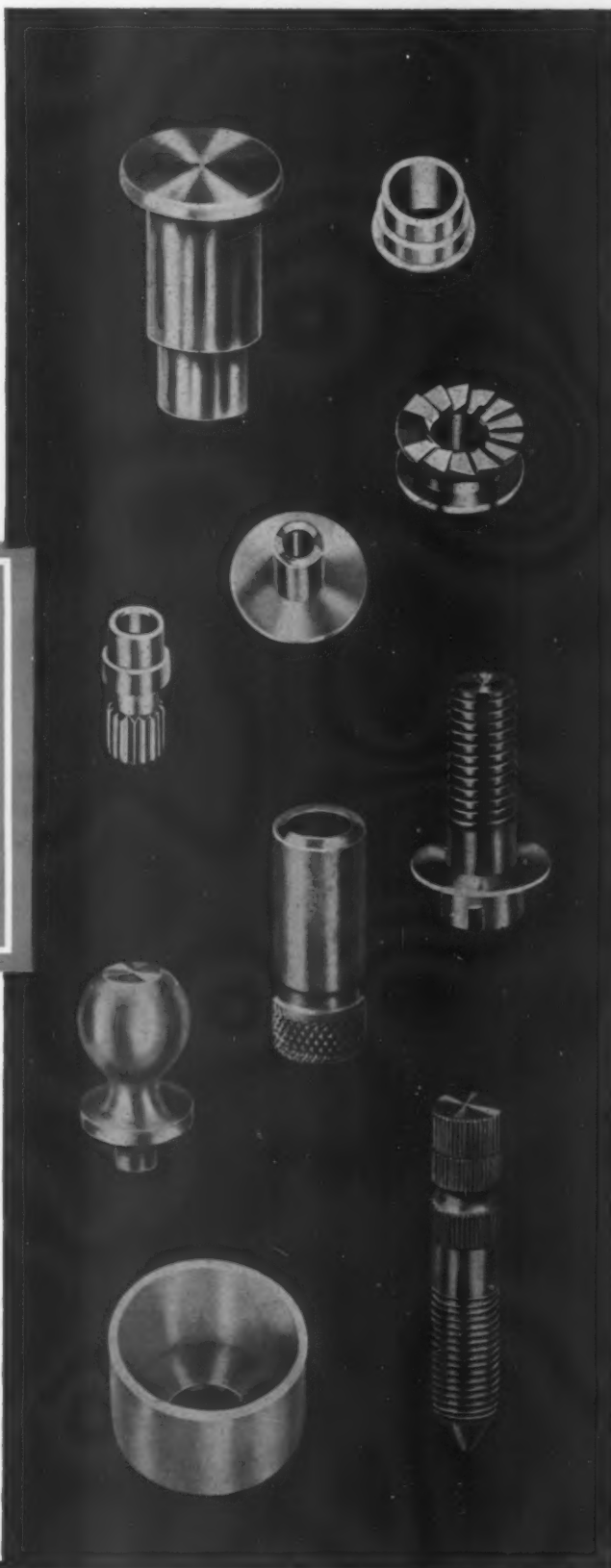
NATIONAL METAL EXPOSITION

OCTOBER 1-4 NEW YORK

## J & L *Improved* BESSEMER SCREW STEEL

NO CHANGE IN CHEMISTRY  
OR PHYSICAL PROPERTIES

At the right are a few of the parts now being made of J&L Improved Bessemer Screw Steel with production increases, according to users' reports, of from 5% to 102%. Forty-one such parts are included in the Jones & Laughlin display. Discuss your screw steel applications with J&L representatives at the National Metal Exposition and learn how your production may be improved by the use of J&L S.A.E. 1112 or J&L Special High Sulphur Bessemer Screw Steel, both of which have been improved radically in free cutting qualities without sacrifice of other desirable properties. Both of these grades are available in hot rolled bars, cold finished bars and drawn wire.



## J & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

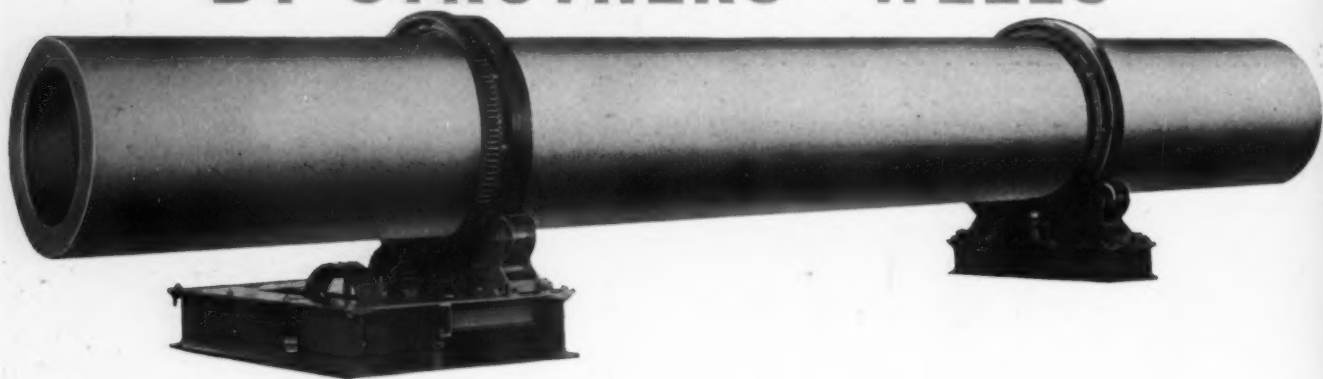
Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit Erie Los Angeles  
Memphis Milwaukee Minneapolis New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco

Warehouses: CHICAGO CINCINNATI DETROIT MEMPHIS NEW ORLEANS PITTSBURGH

Canadian Representatives: JONES & LAUGHLIN STEEL PRODUCTS COMPANY, Pittsburgh, Pa., U. S. A., and Toronto, Ont., Canada

# ALLEGHENY METAL

## ROTARY DRYERS BY STRUTHERS • WELLS



Every chemical engineer knows the highly corrosive action of undried cream of tartar to ordinary metal. Here truly is an excellent example of the ideal adaptability of corrosion-resisting Allegheny Metal in the fabrication of the Rotary Hot Air Dryer by the Struthers-Wells Company of Warren, Pa.

This Dryer, 3 feet in diameter and 30 feet long, was constructed of impervious Allegheny Metal and the dryer shell, annealed as a unit after welding, was given a pickling treatment consisting of sand blasting and nitric acid washing.

This dryer was built for one of the country's largest producers of Baking Powder and represents one of the many ideal uses of rustless Allegheny Metal in the Process Industries.



## ALLEGHENY STEEL COMPANY

BRACKENRIDGE . . . PENNA.

Sales Offices and Warehouse Stocks in the Principal Cities . . . Stocks carried by  
JOS. T. RYERSON & SON, INC. WAREHOUSES

Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia  
and Jersey City . . . Dunham, Carrigan & Hayden Co., San Francisco;  
Union Hardware & Metal Co., Los Angeles

Allegheny Metal is manufactured pursuant to License from the Chemical  
Foundation, Inc., under basic patents No. 1,316,817 and No. 1,339,378.

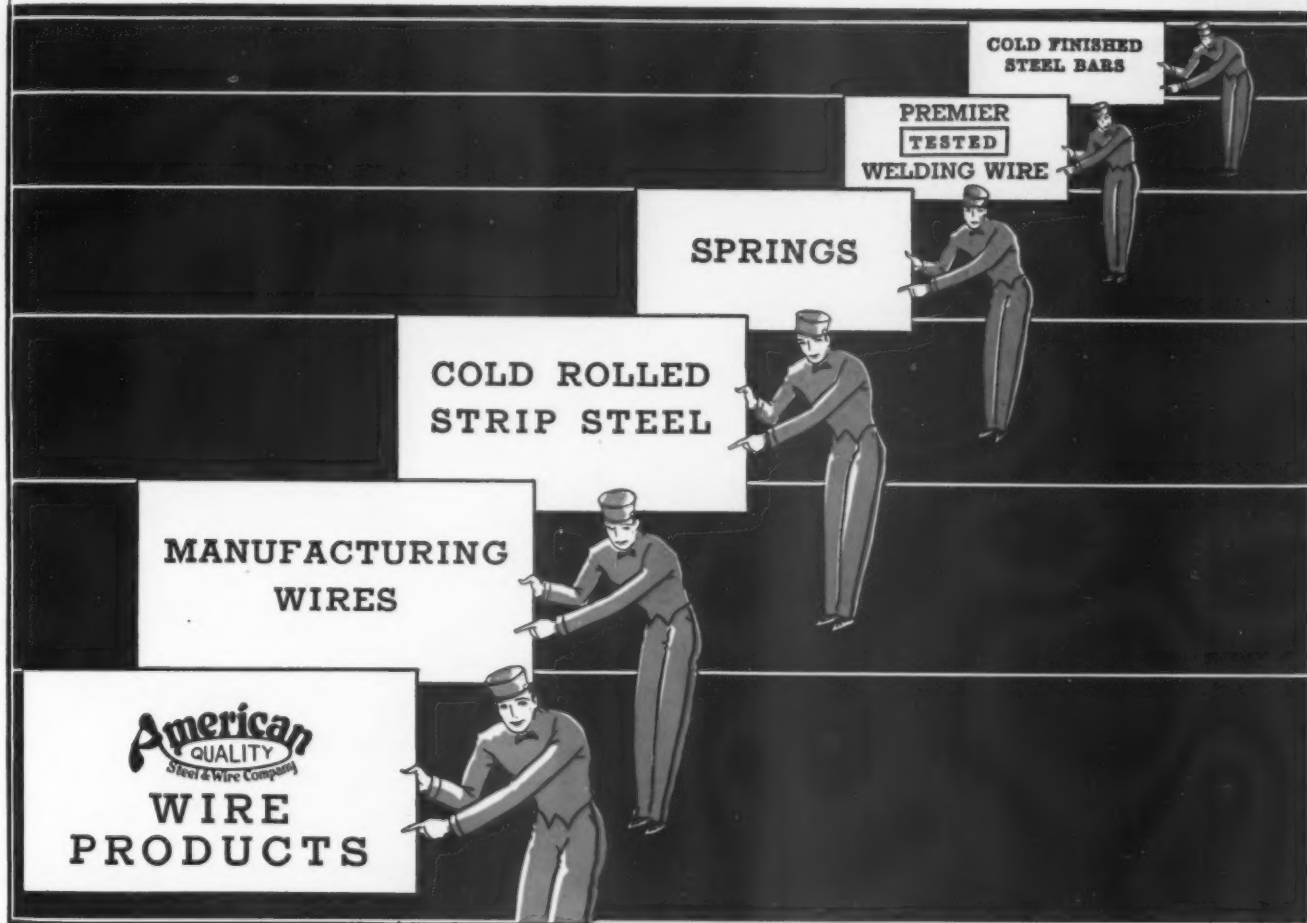
ALLEGHENY PRODUCTS: SHEETS FOR AUTOMOBILE BODIES, METALLIC FURNITURE,  
DEEP DRAWING, ALLEGHENY METAL, ALLEGHENY ALLOYS, ELECTRICAL SHEETS,  
STEEL CASTINGS, SEAMLESS TUBING, BOILER TUBES, PIPE

THE "TIME-TESTED" STAINLESS STEEL



# AMERICAN STEEL & WIRE COMPANY

*Presents*



## Wire Products of the Highest Degree of Craftsmanship

TRADITIONAL, indeed, is the quality of American Steel & Wire Company Wire and Wire Products. Traditional, also, is the Service, Experience and Facilities back of them—their

availability from one reliable source—and the ability of this company to more quickly and economically meet your individual requirements.

*Providing an added advantage to the user—the products shown above are available in Carbon Steels, S. A. E. Alloy Steels and USS Stainless and Heat Resisting Alloy Steels.*

*Please visit our exhibit in Space 142 at the National Metal Exposition.*

1831



1934

# AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago  
94 Grove Street, Worcester

SUBSIDIARY OF UNITED STATES STEEL CORPORATION  
AND ALL PRINCIPAL CITIES

Empire State Building, New York  
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Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

Export Distributors: United States Steel Products Company, New York



**ILLINOIS  
S.A.E. 5140**

# ***SMOOTH* under the tool**

**H**ERE'S an exceptionally clean steel, machines easily, and produces physical properties that have lead to its widespread use for axles, spline shafts, steering knuckles, spindles and other applications where relatively high tensiles are required.

Illinois S. A. E. 5140 is easy on tools; it responds readily to heat treatment; providing the required tensiles and Brinell hardness. It can be annealed to an ideal machining range of 180 to 210 Brinell.

Additional information on this steel and its application to specific uses will be furnished upon request.



**Illinois Steel Company**

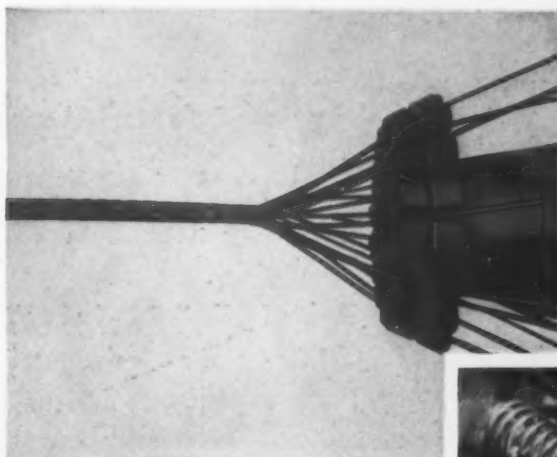
208 SOUTH LA SALLE STREET • • CHICAGO, ILLINOIS  
SUBSIDIARY OF UNITED STATES STEEL CORPORATION



**ILLINOIS *alloy* STEELS**

ALWAYS DEPENDABLE





## LET US TAKE A TRIP . . . THROUGH YOUR PLANT

Let us see how you work wire, study your use of it and what happens after it leaves your plant fabricated into a finished product. Perhaps our engineers can suggest a wire that works faster and easier, causing less wear or breakage of tools.

It is often the case that a wire can be developed for a definite use that has just enough difference in characteristics to overcome difficulties that were formerly accepted only because they were thought to be unavoidable. Such recommendations may result in your getting a better wire for your job and possibly a reduction in cost. We await your invitation.

**WICKWIRE SPENCER STEEL COMPANY**  
New York City; Buffalo, Chicago, Worcester; Pacific Coast  
Headquarters: San Francisco; Warehouses: Los Angeles,  
Seattle, Portland. Export Sales Department: New York City.



# WISSCO WIRE

*by Wickwire Spencer*

Wickwire Spencer manufactures High and Low Carbon Wires—in various tempers, grades and finishes—for your specific purpose. Hard-Drawn, soft or annealed Basic or Bessemer Wires—Hard-Drawn annealed, or oil-tempered Spring Wire, Chrome Vanadium Spring Wire—Valve Spring—Music—Clip—Pin—Hairpin—Hook and Eye—Broom—Stapling—Bookbinding—

Machinery Spring Wire—Reed Wire—Clock—Pinion—Needle-Bar—Screw Stock—Armature Binding—Brush—Card—Florist—Mattress—Shaped—Rope—Welding. Flat Wire and Strip Steel, High or Low Carbon—Hard, annealed or tempered—Clock Spring Steel—Corrosion and Heat Resisting Wires. Consult the Wickwire technical man on your wire problems, however large or small.



**STAINLESS  
-CLAD**

*Steel*

**INSEPARABLY BONDED**  
because

*"Welded  
in the Ingot"*

by an Exclusive Patented Process

IngAclad requires no binder ply between the two metals. An inseparable weld is produced in the ingot in the molten state. You may form, draw, spin, bead, braze, weld, solder and fabricate IngAclad with practically the same equipment used in handling mild carbon steels. Write for special IngAclad folder and facts about its successful use today in practically all industries requiring corrosion-resisting equipment.

**INGERSOLL STEEL & DISC CO.,**

310 S. Michigan Ave.  
Chicago, Ill.

(A Division of Borg-Warner Corporation)

Plants: Chicago, Illinois, and New Castle, Indiana

**ING A CLAD**

Trade Mark  
Registered

**-a  
BORG-  
WARNER  
product**

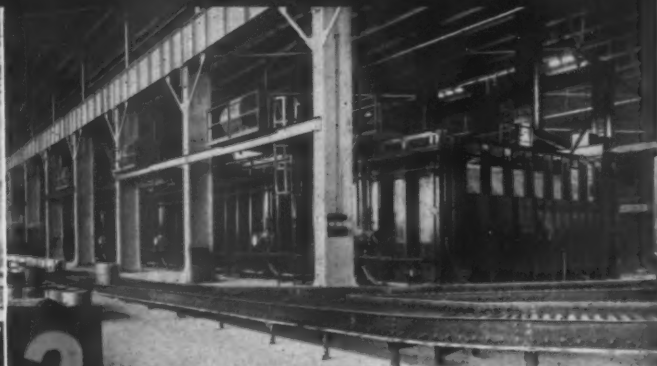
**STAINLESS-CLAD STEEL**



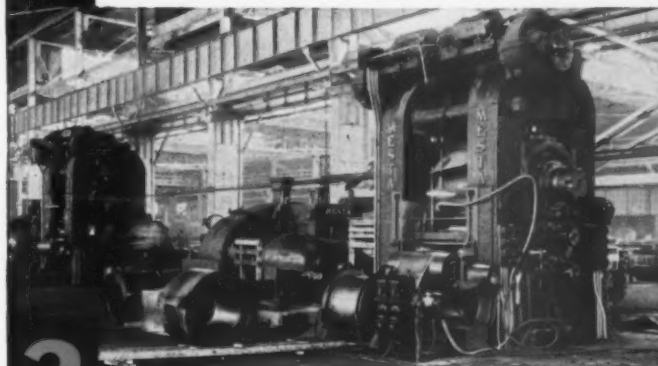
# Why the Inland Tin Plate Mill Is Important to You . . . a User



1 Tandem of five huge, 4-high roll stands embodying latest engineering advances, for reducing strip to tin plate gages.



2 Battery of annealing furnaces where reduced strip is annealed for skin rolling.



3 Skin rolling mills—4-high type—where strip is finished to Inland standards.



4 After shearing to size, black plate is tinned in this battery of pots by best method yet developed.



5 Inland Tin Plate carefully inspected here under the best of lighting conditions, assuring shipment of only the most satisfactory material.

THE best available equipment is the first requirement for producing tin plate of highest quality. Only then do skill and experience have their chance.

And so it is important to every tin plate buyer to know that the Inland Tin Plate Mill incorporates every advance in production equipment, and that every step is in skilled and long-experienced hands. INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago, Illinois.



Sheets Strip Tin Plate  
Plates Structural Piling

# INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Rails Track Accessories  
Bars Rivets Billets

Sales Offices: ST. LOUIS, MILWAUKEE, ST. PAUL, DETROIT, KANSAS CITY, MO., DALLAS

# ATTENTION

**Every Producer  
Every User of Quality Steels**

**When you visit**

the National Metal Congress and Exposition in  
New York, October First to Fifth, you will be  
looking for improved methods and superior  
quality products.

**We have new data**

and will demonstrate improved methods of  
steel ingot production that we believe will be  
helpful to all interested in quality steels.



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BOOTH No. 115

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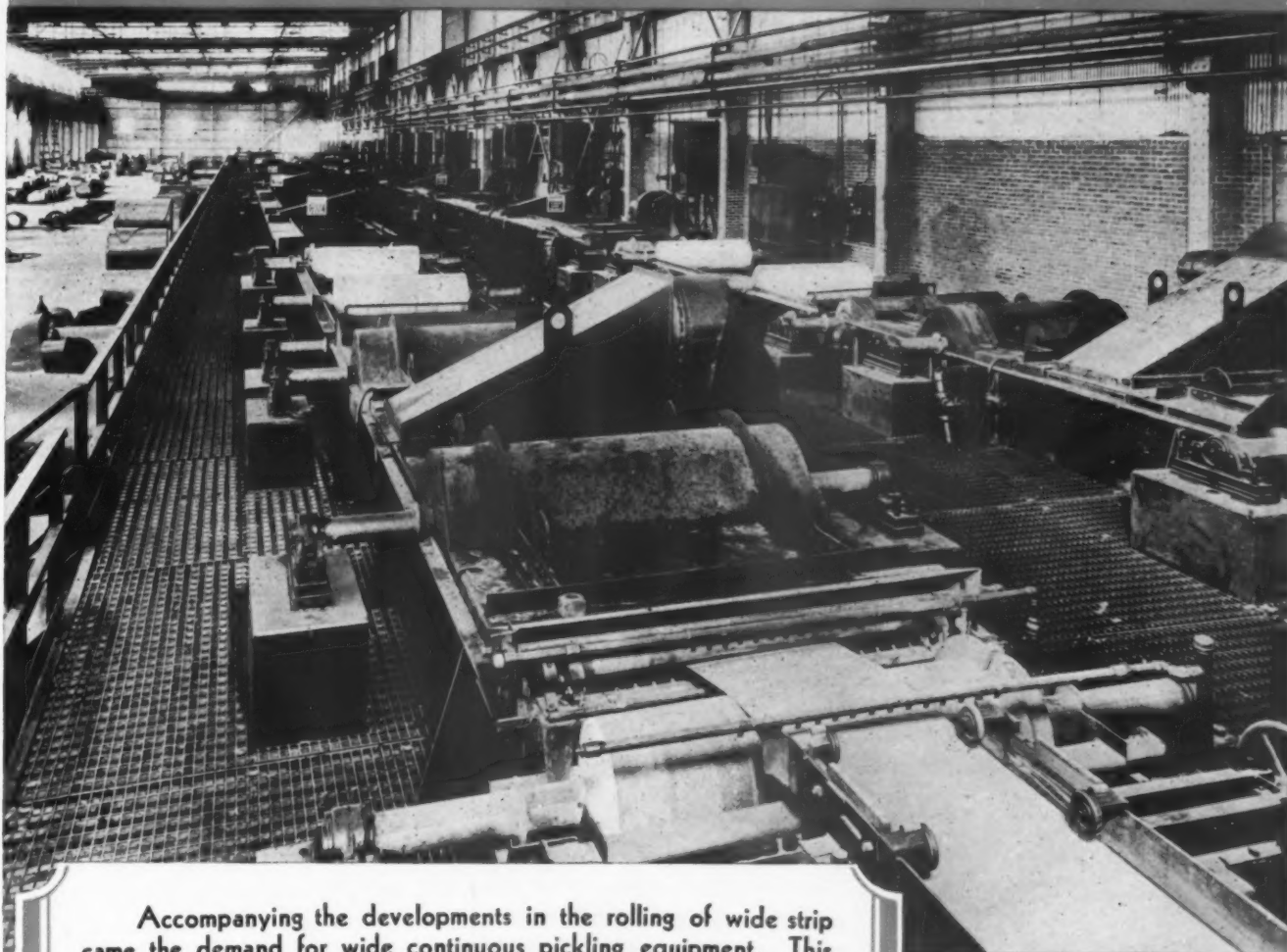
**THE  
GATHMANN ENGINEERING  
COMPANY**

DESIGNERS OF  
INGOT MOLDS SINCE 1909

**BALTIMORE, MARYLAND**



# Mesta CONTINUOUS PICKLING EQUIPMENT



Accompanying the developments in the rolling of wide strip came the demand for wide continuous pickling equipment. This requirement was satisfied by the Mesta Machine Company with the first wide strip unit. Long experience gained in dealing with pickling problems and in building the Mesta Patented Pickling Machine made Mesta Engineers the logical ones to furnish the solution to the problem of continuous pickling.

Since subsequent operations in the modern strip mill depend on the unfailing operation of the continuous pickling train, it is fundamental that this equipment be rugged to assure dependability and eliminate chance of breakdown.

Mesta Continuous Pickling Equipment fulfills these requirements. It is rugged in design and construction to operate under the most severe conditions with continuity and speed.

Wide Continuous Pickling Units  
installed at Inland Steel Company

## MESTA MACHINE COMPANY

PITTSBURGH, PA.

# BASOLIT

*Pickling Tanks  
for Durability*



ONE OF SEVERAL HUNDRED  
BASOLIT INSTALLATIONS  
NOW IN USE

**A** GLANCE at this pickling tank and its associated handling equipment indicates that tank failure would seriously delay production.

It won't fail, however, because the Pressed Steel Tank Co. of Milwaukee took the precaution to install a Basolit Tank which is wear-proof and leak-proof against all commercial acids. Generally sulphuric acid is used. However, metallurgical advance demands frequent use of nitric, hydrochloric acids, etc. Basolit Tanks are safe whatever your future requirements may be.

This 110 ft. Basolit Pickling Tank is used for pickling 200 to 400 tons weekly of seamless steel shells prior to cold drawing operations. It has been in continuous service for nearly 4 years, and has well satisfied its user with negligible maintenance cost.

Play safe by specifying "Basolit" for pickling tanks.

*This tank installed Nov., 1930  
Photographed Nov., 1933*

## NUKEM PRODUCTS CORP., Buffalo, N.Y.

NEW YORK

PITTSBURGH

LOS ANGELES

TORONTO, ONT.





## STAINLESS STEELS RESIST CORROSION

**S**TAINLESS steel combines beauty, strength and durability. Its brilliant lustrous finish will not rust, tarnish nor stain. It is unaffected by weather and many corrosive chemicals. No covering of paint or lacquer, no plated coating is necessary to preserve its distinctive gleam. Its composition is uniform throughout. It is easily fabricated, strong and wear-resistant, radiant and corrosion-resistant. Its unique combination of strength and durability makes possible lightweight, economical construction.

Take advantage of these qualities by applying stainless steel to your product. And take advantage of practical, unbiased information on the uses of stainless steel by calling on Electromet engineers.

### ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

**UCC**



CARBIDE and CARBON BUILDING  
30 EAST 42nd STREET • NEW YORK, N. Y.

**Electromet**  
Ferro-Alloys & Metals

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THE HEART  
*of*  
**THERMALLOY**  
X-RAY INSPECTION DEPT.



X-RAY TUBE EXAMINING CYLINDRICAL RETORT.

**"Quality" Castings Since 1919**

*for*

Carburizing Boxes, Retorts, Lead-Salt-Cyanide Pots—  
Furnace Parts

**THE ELECTRO ALLOYS COMPANY**  
ELYRIA, OHIO

**Thermalloy**

X-RAYED CASTINGS FOR  
HEAT CORROSION  
ABRASION

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# In the search for better and better QUALITY



THROUGHOUT the history of American metallurgy runs the tireless search for better and better quality—cleaner, more homogeneous metals, —finer finished products. And the Titanium Alloy Manufacturing Company has been — still is! — a pioneer in this search.

Producing nearly 30 years ago, the first commercial Titanium Alloy for use in molten steel, TAMCO since then has developed TAM Alloys for practically every class of steel, as well as alloys for other metals.

The two TAM Ferro Carbon Titanium Alloys—TAM *Original* F. C. T. and TAM *Low Carbon* F. C. T.—are outstanding Titanium deoxidizers helping to produce superior steels, from the highest carbon down to the lowest carbon made! Supporting these leaders is a comprehensive list of TAM Alloys and Products for all needs of the practical metallurgist. TAM Standard Low Carbon Ferro Titanium (for cast iron), Webbite (for aluminum), Cupro-Titanium (for copper), Metallic Titanium, Metallic Zirconium, Tizgud (for mold facing), Fluxes (for slags and welding), Refractories and Cements—to name just a few.

*A TAM engineer is always ready and willing to assist your plant with accurate, up-to-the-minute information.*

## ANNOUNCEMENT

TAMCO now offers a full line of Molybdenum Products: TAM Roasted Molybdenum Concentrates, TAM Ferro Molybdenum and TAM Calcium Molybdate.

May we talk with you at the National Metals Exposition, October 1-5? Our Booth is No. 484 in Commerce Hall, New York City.

## THE TITANIUM ALLOY MANUFACTURING CO.

General Offices and Works:  
Niagara Falls, N. Y., U.S.A.

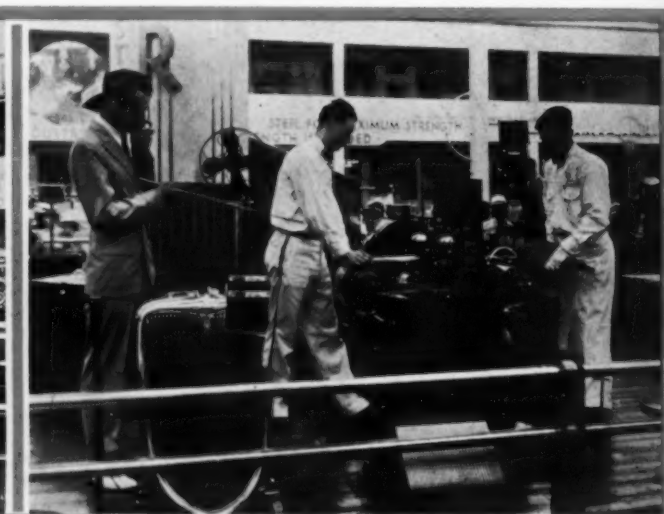
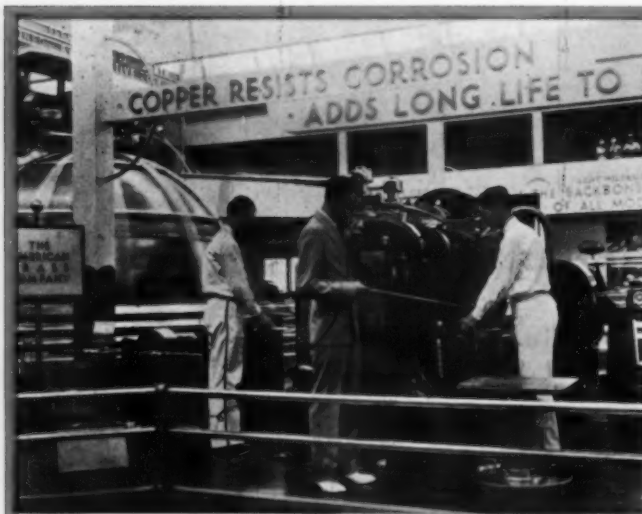
Canadian Representatives  
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23-27, Broomhall St.,  
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**TORRINGTON**—Rolling, Blocking, Slitting and Scrap-cutting equipment operated by The American Brass Company at the Ford Exposition, 1934 Century of Progress, producing brass for Ford Radiator tubes.

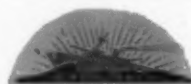
*The Torrington Mfg. Co.*  
*Torrington - Conn., U.S.A.*  
 44 Franklin St.



**FOOLPROOF**  
**Overloads Stop Machine**

*Manufacturers of All Steel Bending Brakes, Bulldozers, Universal Bending Machines, Crankshaft Twisting Machines and other metal forming machinery.*

STEELWELD



BATTLESHIP

## BENDING BRAKES

embody in their design and manufacture those features that insure a maximum of satisfactory service, including—

DEEP THROAT handles work any length

BOX HOUSINGS unbreakable frame

RAM SWIVELS FOR TAPER WORK, no binding on slides or bearings

MICROMETER DIAL GAUGE for die setting

ALL BEARINGS except mains, Anti-friction

BALL JOINTS UNBREAKABLE, steel housed

TWIN DISC CLUTCH AND BRAKE

BRONZE NUTS and GEARS in ram adjustment

ADJUSTING SCREWS heat treated and oversize

Full details, complete description on request

**THE STEELWELD MACHINERY CO.**

EAST 70TH AND MACHINERY AVE.  
 CLEVELAND, OHIO



## A Call for Service

*... and another production problem solved!*

**A**NOTHER BREAKDOWN! Another shutdown! Production tied up all along the line until the key part which failed could be replaced.

Then the chief engineer remembered the good reports he had heard about alloys containing nickel. Decided to let International Nickel's technical staff diagnose the case.

The Nickel Company cooperated. Here was their recommended composition, based on the exhaustive tests of their Research Laboratories. Here was the service data. Moreover, the alloy recommended was readily procurable from a nearby source—and the Nickel Company would cooperate in the treatment and fabrication.

So the problem was solved—a different metal was substituted for the composition which had failed, and similar breakdowns were eliminated.

\* \* \* \*

Every day, International Nickel's technical service is confronted with dozens of similar problems—problems relating to strength, toughness, wear, corrosion and heat effects—and is called into consultation by machinery manufacturers and machinery operators in all of the principal industries.

The accumulated results of years of experiments carried on in our Research Laboratories with alloys of nickel—wrought and cast steels, cast iron, bronzes, corrosion and heat-resistant alloys—and the wide experience of a technical sales organization operating in all industrial countries of the world, are constantly made available to industry, without obligation.

**THE INTERNATIONAL NICKEL COMPANY, INC.**

*Miners, refiners and rollers of Nickel.  
Sole producers of Monel Metal.*

67 WALL STREET

NEW YORK, N. Y.

ALLOYS  
CONTAINING **NICKEL**







## TINKER to EVERS to CHANCE

**W**HAT an infield combination—Joe Tinker, Johnny Evers and Frank Chance! "Tinker to Evers to Chance" are words still spoken reverently. This trio led the Cubs to pennants and world championships. Unbeatable because they formed the perfect combination . . . And because it is the perfect combination of essentials that produce best cadmium plating results, the Udylite Process is favored by manufacturers throughout the world . . . The Udylite plating solution produces lustrous cadmium deposits and does it efficiently and economically; staffs of trained plating engineers and electrochemists are maintained for the benefit of every Udylite user. The Udylite Company first introduced commercial cadmium plating and is responsible for all major developments . . . An efficient, easily maintained plating solution, the finest plating brains to be found anywhere, and the background and experience of the pioneer company—what a combination! Put it to work for you!



**IN SPORT**

**IN BUSINESS — THE RIGHT COMBINATION GETS RESULTS**

The Udylite Process, in actual operation, will be on display at the Steel Show. Be sure to see it —Booth No. 274.

## THE UDYLITE COMPANY

1651 East Grand Blvd., Detroit, Mich.

NEW YORK  
30 E. 42nd St.

★ CHICAGO  
205 Wacker Drive

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708 Keith Bldg.

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**LEE-  
BUILT  
SPRINGS**

## OF STAINLESS STEEL

Combining **STRENGTH** and **RESILIENCY** with properties to resist **ABRASION, CORROSION, HIGH TEMPERATURES, RUST-STAIN**, without the need of plating.

It is now commercially practical to obtain **SPRINGS** of **STAINLESS STEEL**.

Increasing the sales appeal of your product, or keeping the position it now holds, may depend on advance engineering design. This may include **SPRINGS** of **STAINLESS STEEL**. Consult us about any problem you may have.



**LEE SPRING COMPANY, INC.**  
30 MAIN ST. BROOKLYN, N.Y.



Send Us Your Special Folder on **STAINLESS STEEL SPRINGS**  
NAME .....  
ADDRESS .....

# MAURATH

## Arc Welding ELECTRODES

Maurath Processed Electrodes stand the most drastic test and service and produce an exact analysis without loss of elements or adding injurious inclusions.



*See me at the National Metal Congress for first hand information on welding of Stainless and Heat-Resisting Alloys.*

*Whitey Maurath*

If you weld stainless alloys buy from the oldest company producing Alloy Electrodes exclusively and serving the world's leading steel producers and users.

Chromium 4% to 6% with tungsten or molybdenum.

Chromium 15%

Chromium 18%

Chromium 28%

Chromium 18% and Nickel 8% Carbon under .07 also with titanium.

Chromium 18% and Nickel 8% Silicon 2½%

Chromium 18% and Nickel 8% Molybdenum 2½%, Carbon under .07



Chromium 24% and Nickel 12%

Chromium 29% and Nickel 9%

Chromium 15% and Nickel 35%

Chromium 15% and Nickel 60%

Chromium 20% and Nickel 80%

Chromium 25% and Nickel 18% Silicon 2½%

Chromium 20% and Nickel 25% Silicon 2½%

### MAURATH, Inc.

7400 Union Ave., Cleveland, Ohio



# SHOW NOW GOING ON

*in Thousands of Plants*



☆ **"Shield-Arc"** ☆  
starring in  
**Manual Welding**

"Shield-Arc" stars in every performance due to its uniform current, high KW capacity and high efficiency. Eight other features also help "Shield-Arc" produce quality welds at lowest cost. No other welder has all the features possessed by "Shield-Arc."

**SPECIAL  
PERFORMANCE**  
OCT. 1-2-3-4-5 at  
*Metal Congress*  
**Booth 102**

☆ **"Electronic Tornado"** ☆  
starring in  
**Automatic Welding**

"Electronic Tornado" enjoys a record run wherever used for production welding due to its cost-cutting, time-saving performance. Its shielded arc welds pipe, tanks, pressure vessels, barrels, automotive machinery parts for hundreds of manufacturers.

☆ **ALL STAR CAST OF ELECTRODES** ☆

**For Mild Steel**

**"FLEETWELD"**

The most popular shielded arc rod on the market. Produces welds in any position—having tensile strength of 65,000 to 75,000 lbs. per sq. in.—ductility, 20 to 30 per cent elongation in two inches—better than mild steel for resistance to impact, fatigue and corrosion—density 7.82 to 7.86 gr. per c. c. Speed of welding is two to three times faster than with ordinary rods.

**For Cast Iron**

**"FERROWELD"**

Proclaimed by users to be the greatest rod ever produced for cast iron welding. Welds have greater tensile strength and ductility than cast iron. Welding with "Ferroweld" creates less thermal disturbance in the cast iron, resulting in less hardness.

**For Light Sheet Metal**

**"LIGHTWELD"**

There is hardly a ripple in welds made with this rod in 18 ga. to 24 ga. sheet metal. Speed of welding is exceptionally fast with "Lightweld" which makes it very easy to handle as well as economical to use.

**For Hi-Tensile Steel**

**"SHIELD-ARC 85"**

A new shielded arc rod which makes welds of 85,000 to 100,000 lbs. per sq. in. tensile strength in high tensile steels. The ductility of the welds is 15 to 20 per cent elongation in two inches. In mild steel, the welds have slightly lower tensile strength.

**For Aluminum**

**"ALUMINWELD"**

Preferred by those who weld aluminum. Weld metal has unusually high density. Will not cause discoloration when welds are polished. The high quality of the welds produced by "Aluminweld" puts this electrode in a class by itself.

**For Wear Resistance**

**"WEARWELD"**

For building up surfaces of non-austenitic steels to resist shock and abrasion this shielded arc rod produces welds of exceptional hardness and toughness—single bead on mild steel, 40 to 45 Rockwell C; multiple beads 48 to 52 Rockwell C. On higher carbon steels the weld hardness is much greater. Very thin beads with smooth surface can be obtained easily with "Wearweld."

**For 18-8 Stainless Steel**

**"STAINWELD A"**

Welds made with this rod when ground and polished cannot be distinguished from the base metal. The strength, ductility and corrosion resistance of the welds are virtually the same as 18-8 stainless steel.

**For Manganese Steel**

**"MANGANWELD"**

A shielded arc rod which produces a flat bead with no surface checks. The high density weld is extremely tough and hard. The hardness increases when weld is cold worked. Wear resistance of welds made with "Manganweld" is equal to that of heat-treated cast manganese steel.

**For Hard Surfacing**

**"HARDWELD"**

On rail and similar steel "Hardweld" produces hard, tough, shock and abrasion-resistant surfaces. The hardness increases on cold working or quenching, yet the welds do not spall or check. Its flat beads reduce grinding to a minimum.

ASK for private showing of any or all of these all-star welding performers on your work.

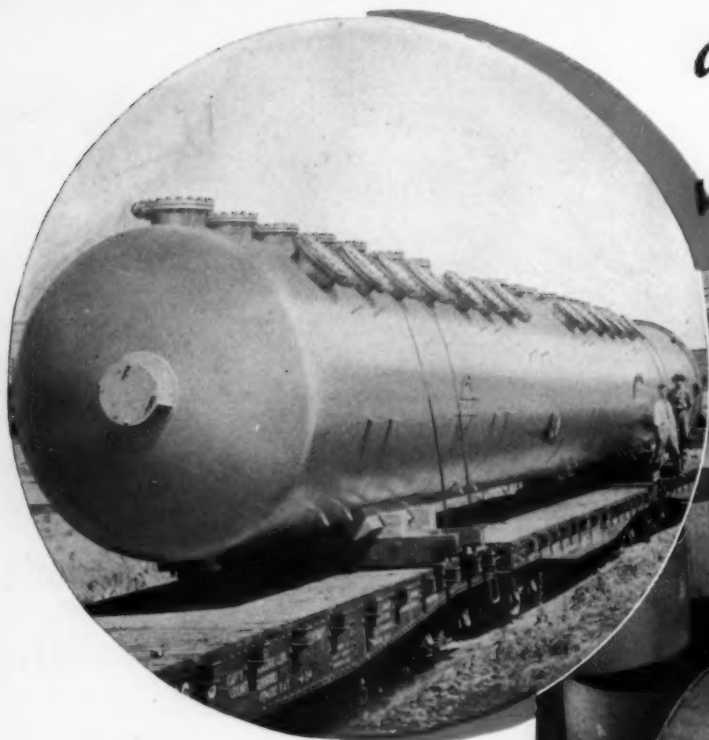
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**THE LINCOLN ELECTRIC CO., Cleveland, Ohio**

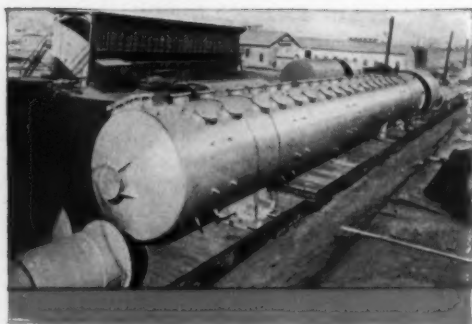
LARGEST MANUFACTURERS OF ARC WELDING EQUIPMENT IN THE WORLD

# BUBBLE TOWERS AND BEER TANKS

*are better products  
when MUREX welded*



Above: 9' 6" x 96' 4" bubble tower, with  $\frac{5}{8}$ " shell and  $\frac{3}{4}$ " heads, welded with Murex by American Tank & Equipment Corporation. Right: Beer tanks, 11' 8" x 9' 10" and 13' 6", manufactured from  $\frac{3}{8}$ " plate by American Tank & Equipment Corporation.



9' x 93' 6" flash tower with  $\frac{7}{16}$ " shell and  $\frac{9}{16}$ " heads. Constructed by American Tank & Equipment Corporation, subsidiary of Black, Sivalls & Bryson, Oklahoma City, Oklahoma.

**T**HE fabrication by welding of oil refinery equipment calls for electrodes that assure welds of highest quality. Bubble and flash towers, separators and scrubbers operate at working pressures of hundreds of pounds per square inch.

In making tanks and similar brewery equipment, other factors are important. Here, smooth clean deposits are necessary, both for appearance sake and to provide easy thorough cleansing.

The American Tank & Equipment Corporation finds that Murex makes it easy to obtain better welds on both these classes of work. By protecting both arc and molten weld metal, these all-mineral coated electrodes consistently produce flawless welds of high tensile strength and ductility. By reducing spatter to a minimum, they assure smoother, cleaner deposits.

And, Murex welding is economical welding. The unusual efficiency of Murex Electrodes has effected real reductions in welding costs for many manufacturers.

*Send for booklet.*

METAL & THERMIT CORP., 120 Broadway, New York, N. Y.  
Albany • Chicago • Pittsburgh • So. San Francisco • Toronto

# M U R E X

## HEAVY MINERAL COATED ELECTRODES



"WE ORDER EVERYTHING FOR OXWELDING AND CUTTING FROM LINDE"

# Linde Process Service



• Pinion gears, connecting links, reach blocks, pall levers and dipper teeth are shape-cut from strong alloy steels in routine operations. These dipper teeth are being accurately formed from alloy steel stock.

## WIDENS USEFULNESS OF OXY-ACETYLENE MACHINE CUTTING

RECENTLY a power shovel manufacturer reported how Linde Process Service helped perfect a series of complicated flame-cutting operations:

"We started to use oxy-acetylene shape-cutting several years ago—at first, only for dipper teeth. Later we used it on many other parts for which the strength of rolled or forged steel was desirable.

"On these parts oxy-acetylene cutting proved so profitable that

we asked Linde to help us develop accurate shape-cutting of our heaviest parts from slabs and ingots.

"Linde Service Operators assisted in organizing this heavy cutting and advised on preheating procedures for special strong alloy steels. They supplied data on most efficient oxygen pressures, nozzle sizes, and cutting speeds.

"Now, we have replaced nine machines with two shape-cutting machines. We are cutting heavy steel to tolerances of 1/32-in. and less. We shape-cut parts accurately from steel 20 in. thick. Angle corners and curved cuts are simple for us."

By translating proved methods into terms of actual plant requirements Linde Process Service helped organize these shape-cutting operations for greatest speed, economy and dependability. It can probably help you in similar work. Ask the nearest Linde Sales Office to show you how.

**LINDE OXYGEN**  
... plants and warehouses in all industrial centers.

**PREST-O-LITE ACETYLENE**  
... the standard for well over a quarter of a century.

**UNION CARBIDE**  
... sold in the familiar Blue and Grey drum from over 250 warehouse stocks.

**OXWELD APPARATUS AND SUPPLIES**—Oxweld offers the maximum value in oxy-acetylene equipment. Blowpipes, regulators, acetylene generators, welding rods, and supplies—are available for every welding and cutting operation. Complete stocks and service stations are located in all principal cities.

## THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation



IN CANADA, DOMINION OXYGEN CO., LTD., TORONTO

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE



Users of products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. You are cordially invited to visit this year the numerous exhibits sponsored by the Corporation in both the Basic and Applied Science sections in the Hall of Science at Chicago's 1934 A Century of Progress Exposition.

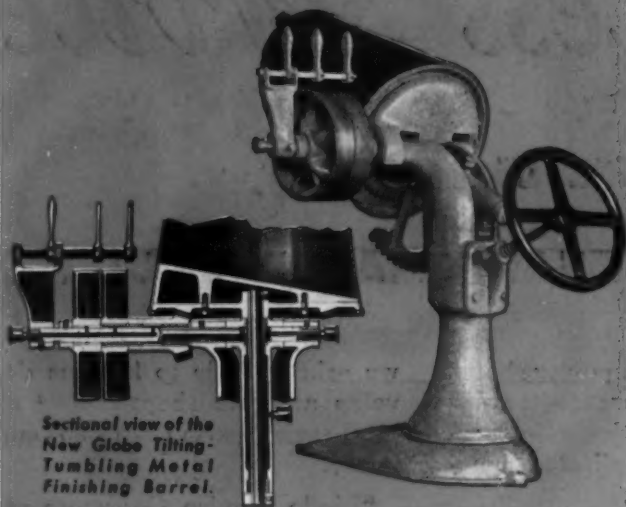
### Sales Offices:

Atlanta	Houston	Portland, Ore.
Baltimore	Indianapolis	St. Louis
Birmingham	Kansas City	Salt Lake City
Boston	Los Angeles	San Francisco
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Cleveland	New Orleans	
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# NEW



Sectional view of the  
New Globe Tilting-  
Tumbling Metal  
Finishing Barrel.

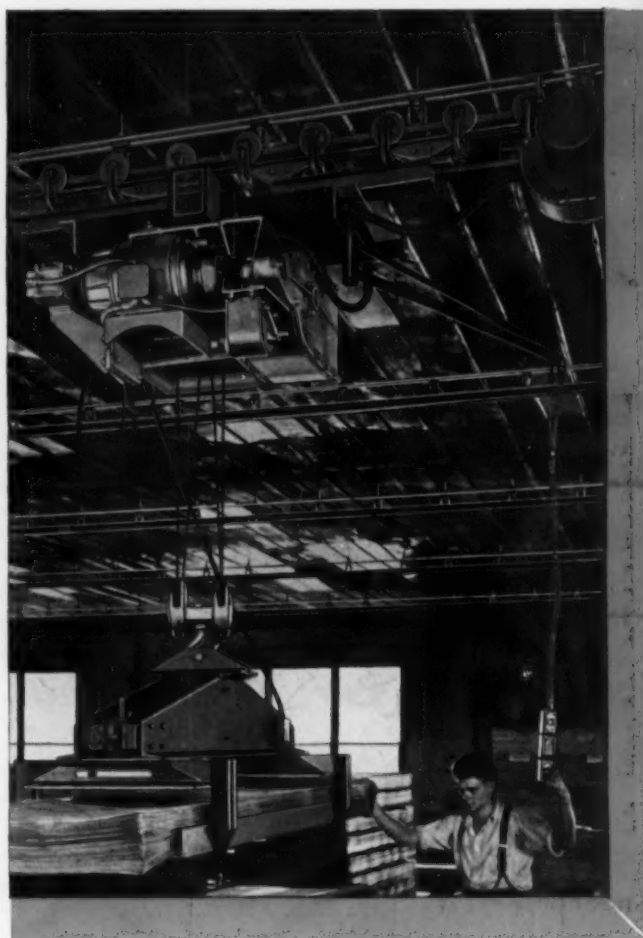
Globe introduces an exceptional line of Tumbling and Burnishing Equipment on exhibit in Booth 444 at the National Metal Exposition, Commerce Hall, New York City, October 1st to 5th, 1934.

Note: If you do not attend the National Metal Exposition, we suggest that you send for the NEW Globe Catalog "B-4" which features the complete line of Globe Finishing Barrels.

## THE GLOBE

MACHINE & STAMPING COMPANY  
1200-1250 WEST 76th STREET  
CLEVELAND • OHIO

MANUFACTURERS OF TUMBLING AND  
BURNISHING BARRELS FOR 27 YEARS



American MonoRail's engineering ingenuity suits equipment to the job! *The Problem*: Handling 2-ton bundles of flat-rolled steel sheets for National Gypsum. *The Solution*: Specially designed grab equipment, plus powerful hoist, plus American MonoRail's pneumatic-tire drive tractor—all electrically operated by one man.

Whether your hoisting and conveying problem is simple or complicated, American MonoRail engineers can solve it efficiently, effectively and economically.

Write for details.

THE AMERICAN MONORAIL COMPANY  
13107 Athens Avenue, Cleveland, Ohio

Eastern Branch: Philadelphia

Western Branch: Chicago

(Distributors in All Principal Cities)

### AMERICAN MONORAIL

FABRICATED TO FIT

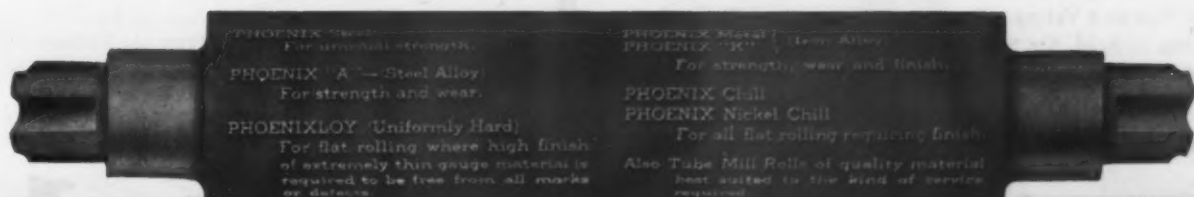
# MODERN ROLL TECHNIQUE



## D I S T I N C T I O N

Sixty years of roll making, each year marked by contributions to the progress of the industry, have given Phoenix Rolls an earned rep-

utation for performance and long life. These rolls have distinctive qualities which are recognized by rolling mills internationally.



**PITTSBURGH ROLLS CORPORATION**  
PITTSBURGH, ... PA.

# FOUR YEARS in any Goodrich

**I**F acid leakage is one of your worries, listen to this—in the last four years Goodrich Triflex tanks have been installed in plants all over the country, and not one has ever sprung a leak. In every case costs have been lowered, and in most cases the tanks have saved enough in a year to repay their entire investment.

No other tank lining ever developed can even approach such a record of trouble-free service. Goodrich Triflex assures it because of this unique construction:



● Applying Triflex lining inside a steel railroad tank car. When lined by the exclusive Goodrich Vulcalock process, an adhesion of 500 to 700 lbs. per sq. in. is assured between rubber and metal.

**①** A layer of hard rubber vulcanized between two layers of soft rubber. The hard rubber resists acids and oxidation, and is made with expansion joints which, aided by the soft rubber layers, take up all strains caused by expansion and contraction.

Where service is not severe, a single layer of rubber may be used. Because of long experience, Goodrich engineers know the exact rubber compound to use for the acid you employ, to avoid contamination and to assure maximum life for the tank lining.

**②** The inner layer of soft rubber is bonded to the steel tank by the Vulcalock process, assuring a permanent bond because it gives an adhesion of 500 to 700 lbs. per square inch.



● Vulcalock pressure and storage tank installation for handling hydrochloric acid. From the Vulcalock-lined tank car, acid is discharged through Goodrich acid hose into the storage tank, which is also rubber lined.

**GOODRICH MECHANICAL RUBBER GOODS INCLUDE:**

Rubber Lining for Plating, Pickling and Storage Tanks, Tank Cars, Pipe and Valves... Conveyor, Elevator and Transmission Belting... Acid, Air, Steam, Water and Suction Hose... Hard Rubber Goods... Packing... Molded Rubber Products... and a Complete Line of Miscellaneous Rubber Items.

# Goodrich



# without a leak TRIFLEX Tank

③ Linings subject to impact and heat as in pickling, are protected by a sheathing of Vitrobond and brick with rubber expansion joints in the brick wall.

Maintenance of acid tanks is a definite expense when other types of lining are employed. Transfer it to net profit by the use of the Vulcalock lining process. By working with engineers of many plants on the problems of acid handling, Goodrich engineers have accumulated a fund of valuable data which they will be glad to make available to you without obligation, for the reduction of your costs. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio. (In Canada: Canadian Goodrich Co., Ltd., Kitchener, Ont.)



● Lining a Goodrich rubber-lined tank with brick, for use in a pickling operation. The brick protects the rubber from the gouging and impact common in such work.



● Brick-sheathed, Triflex-lined, Vulcalock tanks in the modern plant of a large wire manufacturer.



● A 100% Vulcalock installation. The steel storage and pressure tank, steel pipe and fittings, valves—all are Goodrich lined. Hydrochloric acid is the product handled.

## Rubber Lining

ALL products problems IN RUBBER

# See AIRCO'S big w at the NATIONAL METAL EX

**See** the AIRCO-DB PIPE  
CUTTING and BEVEL-  
ING MACHINE.

A portable oxyacetylene machine  
for preparing pipe for welding.  
Cuts and bevels in one operation.

**See** the AIRCO-DB WELD  
TESTING MACHINE.

A portable machine for making  
tensile and bend tests in the field.

**See** the AIRCO-DB TWO-  
STAGE REDUCTION  
OXYGEN and ACETY-  
LENE PRESSURE  
REGULATORS.

Once set for a given delivery  
pressure they hold that pressure  
from start to finish of cylinder  
discharge, automatically compen-  
sating for drop in cylinder pres-  
sure.

**See** AIRCO'S Complete  
Line of HAND WELD-  
ING and CUTTING  
APPARATUS and  
SUPPLIES.

Includes everything needed in  
oxyacetylene welding and cutting  
by hand.



## AIR REDUCTION SA

General Offices: 60 E. 42nd St., New York, N.Y. Distr

A NATION-WIDE SUPPLY SERVICE for GA

# g working exhibit

L EXPOSITION, NEW YORK CITY, OCT. 1-5

See the latest developments  
in **GAS CUTTING  
MACHINES**  
in action!

A representative group from AIRCO'S complete line of Oxyacetylene Cutting Machines will be demonstrated. Included will be both stationary and portable types covering the entire scope of MACHINE GAS CUTTING . . . machines which automatically reproduce from cam or templet with motor-driven magnetic tracer . . . machines which reproduce from outline drawing with motor-driven manually-guided tracer. The new No. 1 TRACTOGRAPH, a small, portable, motor-propelled, hand-guided machine for cutting over extended areas, will be featured. To the uninitiated the range and scope of these machines, the cutting speed, the narrow kerf and the clean finish will be a revelation. It's a demonstration packed with product-improving and profit-increasing ideas for every designer and manufacturer of ferrous metal products. Don't fail to see it.

If you do not attend the Exposition we will be glad to send you, upon request, full details of any of the processes or products mentioned on these pages.

See

Brass and Copper Pipe joined without threads by the new AIRCO-BRAZE Process

using WALSEAL Bronze Fittings which have a ring of SIL-FOS brazing alloy inserted in a groove in each end.

See

the demonstration of **HARD FACING** with **STOODY** Products.

The process that makes tools and parts subject to wear last longer, and gives them new life when they are worn.

See

the products of **AIRCO-NATIONAL CARBIDE**

including carbide lights and lanterns.

See

**AIRCO-WILSON ARC WELDERS**

now sold exclusively by AIR REDUCTION SALES CO. and franchised distributors. This exhibit will feature AIRCO Shielded Arc Electrodes.

N SALES COMPANY

Y. District Offices and Distributing Stations in Principal Cities

r GAS and ELECTRIC WELDING and GAS CUTTING



# AJAX

## *Announces*

*a new*

# FORGING MACHINE



## Built on *50 years* Experience

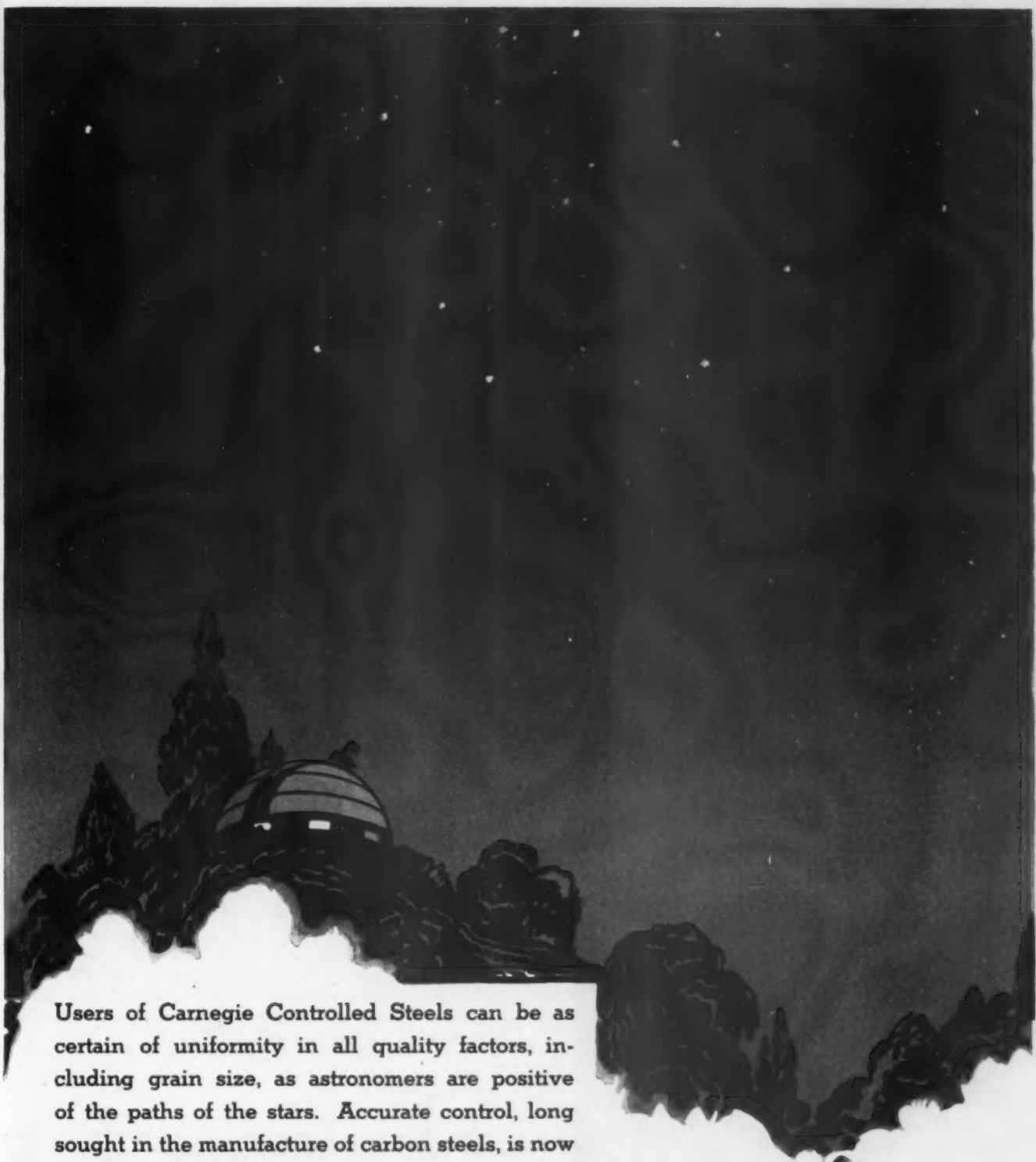
CULMINATING four years of intensive development work in a field in which this company and its founders have pioneered for fifty years, we are pleased to announce the **AJAX AIR CLUTCH FORGING MACHINE** in a complete line of seven standard sizes from 2' to 7' inclusive.

The Air Clutch, a novel and original Ajax contribution to forging machine construction, gives quick-acting, effortless tripping resulting in considerably increased outputs, while maximum rigidity and accurate alignment, with provision for maintaining same over long periods of operation, improve the quality and facilitate the production of an increased variety of both simple and intricate upset forgings.

**THE AJAX MANUFACTURING COMPANY**

**EUCLID BRANCH P. O., CLEVELAND**

**CHICAGO OFFICE: 621 MARQUETTE BLDG.**



Users of Carnegie Controlled Steels can be as certain of uniformity in all quality factors, including grain size, as astronomers are positive of the paths of the stars. Accurate control, long sought in the manufacture of carbon steels, is now an accomplished fact... a standard procedure with Carnegie. Our metallurgists will be glad to discuss this important development with you.

SEE OUR EXHIBIT at the  
National Metal Exposition  
Oct. 1-5 • New York City

280

# CARNEGIE *Controlled* STEELS



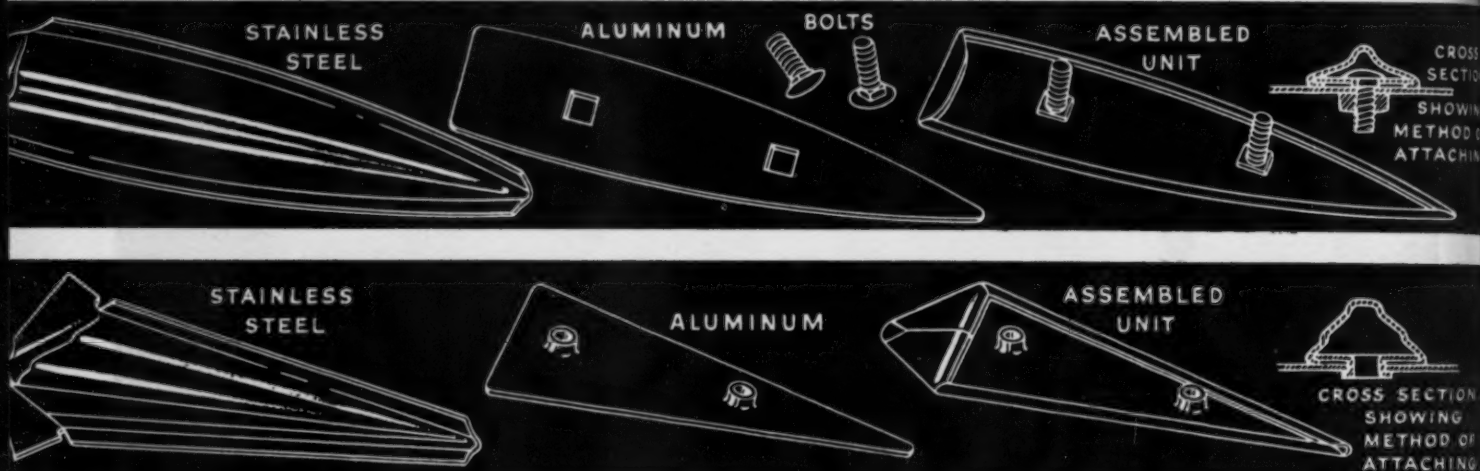
Product of CARNEGIE STEEL COMPANY • Subsidiary of United States Steel Corporation • PITTSBURGH, PA.



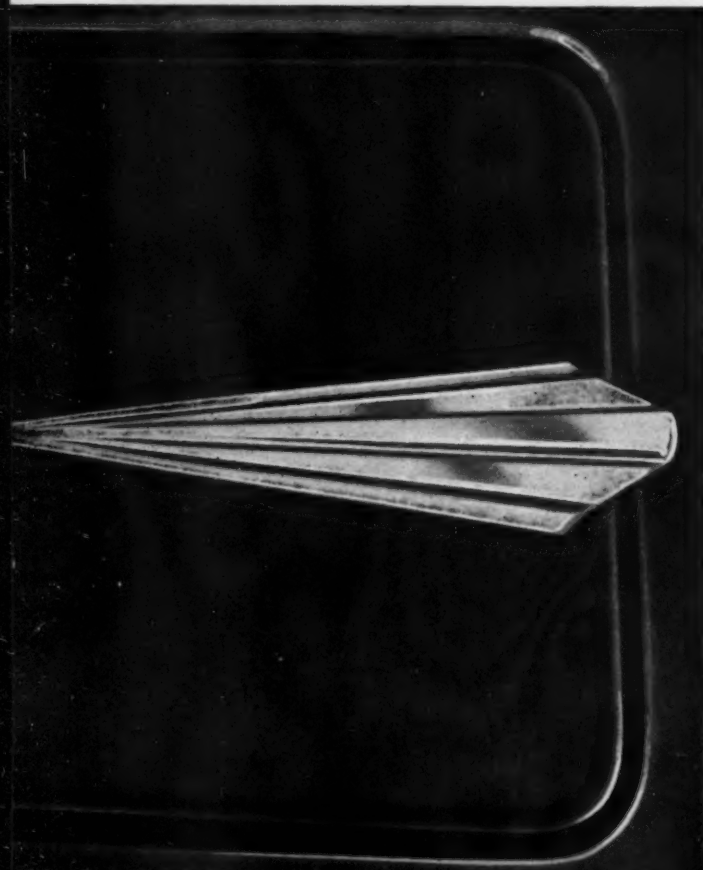
*Left*—This shiny cowl vent moulding of Stainless Steel is right before the eye of everyone who sits in the automobile. It has to be bright—permanently. It will be, because Stainless Steel is the same clear through. These cost less than similar plated parts.

*Below*—This simple construction . . . only one piece of Stainless, a bottom plate of aluminum and two screws . . . make this cowl vent moulding. Perhaps you can use this type of design for permanently bright trim on your products? What a lot of ornamentation for a few cents worth of Stainless!

The drawing below shows the construction of this cowl vent moulding; the photograph above shows it in use.



The drawing above shows the construction of this hood door moulding; the photograph below shows it in place.



*Above*—A simple stamping of light gauge Stainless plus a simple stamping of aluminum punched into hollow rivets—that's all there is to it. Costs are bound to be low, and it does its job so well that any other construction is bound to be classed as a substitute. Where on your product can you use this simple idea to advantage?

*Left*—These hood door mouldings add spots of brightness to the car that carries them. Nothing that splashes them in passing, will rob them of their everlasting brightness . . . and they cost less than plating.

Material costs have been kept to a minimum by using Stainless Steel strip in thin sections. This is possible because Stainless is far stronger than mild steel, and far more resistant to abrasion and denting.

# Carpenter



# HOW TO USE STAINLESS STEEL

*and still  
save money*

**HERE IS ONE PROVEN WAY TO GET  
THE EVERLASTING BRILLIANCE OF  
STAINLESS STEEL AND KEEP COSTS  
IN LINE.**

**T**HESE pieces of trim are more everlastingly beautiful than die-castings or plated sheet metal—for they are Stainless Steel, their lustre is permanent and they can be cleaned with a damp cloth.

Yet costs are kept low by designing them for Stainless Steel in the first place—instead of trying to adapt old designs to it.

On the opposite page you see the photographs of stainless pieces used to enhance the beauty of motor cars. You can study the drawings to see how simply these bright parts are made.

Design your products and parts from the start, to be made of Stainless Steel . . . remembering that you'll do the job **EASIER** with Carpenter Stainless Steel . . . and you'll frequently be surprised at the low cost.

To help you do this, Carpenter has designed a handy, pocket-size slide chart to give at a glance a summary of technical data on all its Stainless Steels. You'll want it handy all the time. It's just a mass of facts, physical properties, working properties, heat treatments, etc. Send the coupon below right away and get one for your desk—free, of course.

**THE CARPENTER STEEL COMPANY**  
W. Bern Street, Reading, Pa.

*Licensee of American Stainless Steel Company, and of Chemical Foundation, Inc.*

## Summary of TECHNICAL DATA OF Carpenter STAINLESS STEELS

1. Stainless steels are defined as iron-base alloys containing at least 10.5% chromium. They are distinguished from other alloys by their resistance to corrosion and oxidation.

Steel Name	Typical Analysis
Type 304	18% Cr, 8% Ni
Type 316	16% Cr, 10% Ni, 2% Mo
Type 321	18% Cr, 11% Ni
Type 302	18% Cr, 8% Ni
Type 307	18% Cr, 8% Ni
Type 308	19% Cr, 9% Ni
Type 309	23% Cr, 12% Ni
Type 310	25% Cr, 20% Ni
Type 312	19% Cr, 11% Ni
Type 314	19% Cr, 9% Ni
Type 315	19% Cr, 9% Ni
Type 317	19% Cr, 13% Ni
Type 318	19% Cr, 13% Ni
Type 319	19% Cr, 13% Ni
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Type 399	19% Cr, 13% Ni
Type 400	19% Cr, 13% Ni

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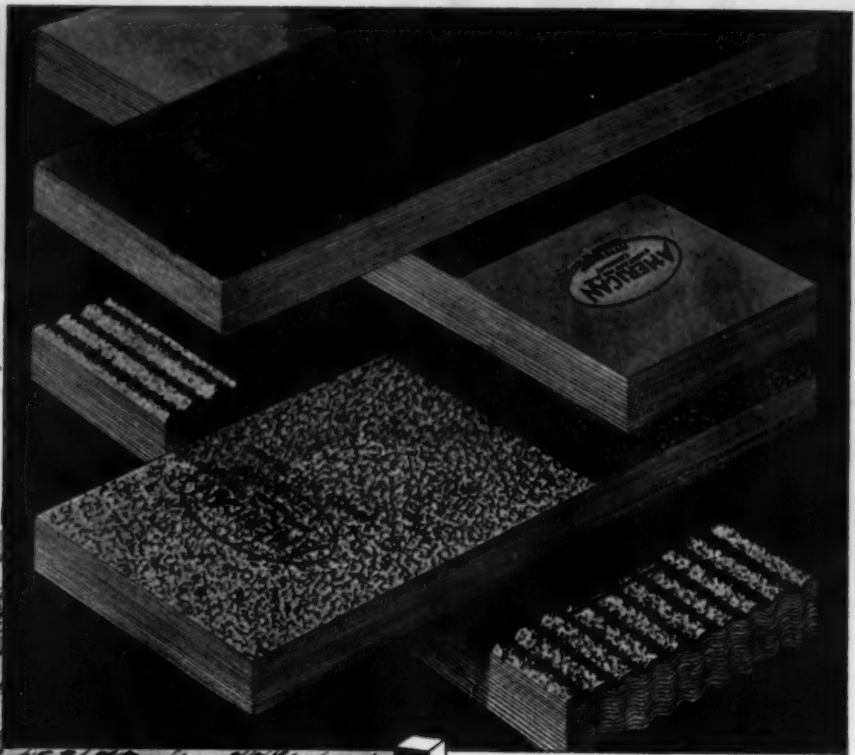


**PLANNING  
FOR 50 MORE  
YEARS**



**STEEL  
SHEETS**  
*for Every  
Purpose*

Sold by  
leading  
metal merchants



## **APOLLO Best Bloom Galvanized Sheets**

IT IS fifty years now since APOLLO Best Bloom Galvanized Steel Sheets were first offered for the use of industry. No other brand of galvanized sheets in this country or elsewhere has since been bought and used in equal volume. Lasting and satisfactory service must have been given.

The same alertness, thoroughness, and forward-looking policy that put the APOLLO brand ahead, and has made the AMERICAN line as a whole so comprehensive and modern, may be relied upon for the future. Untiring research will be devoted and every necessary resource employed to meet new demands as they arise. Correspondence is invited on any proposed use of Black and Galvanized Steel Sheets, Tin and Terne Plates. Send for literature.



**American Sheet and Tin Plate Company**

GENERAL OFFICES; Frick Building, PITTSBURGH, PA.

*United States Steel Corporation Subsidiary*



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# 1 1/4 MINUTES about *Assembly Costs*



• In our eagerness to tell you how much we can save you on the cost of parts or how we can improve their performance or life, we sometimes feel we give too little stress to what can be saved in assembly costs by using all the versatile talents of Alcoa Aluminum.

Extruded Shapes of Alcoa Aluminum will save you assembly costs because you make one shape (to your own design) take the place of two or more standard shapes in combinations that cost money to put together. You save metal this way, too.

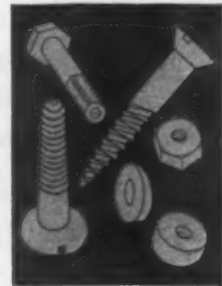


Die Castings of Alcoa Aluminum will save you assembly costs because they can be made what are really integral pieces of different kinds of metal by casting into proper position of studs, bushings, inserts, etc.

Our volume production of Alcoa Aluminum Bolts, Nuts, Screws, Rivets, and other standard assembly hardware is stocked to save you assembly costs.

There are some very recent developments in welding technique—torch, arc, spot and seam—that will save you assembly costs.

Any Alcoa Aluminum part simplifies assembly because it is lighter to handle. Alcoa Aluminum is making news every day. Perhaps it is some time since you talked with one of our engineers. It will pay you to discuss your problem with him. Address Aluminum Company of America, 1885 Gulf Building, Pittsburgh.



[ \*There is nothing elsewhere in this advertisement to remind you that Alcoa Aluminum has the tensile strength of structural steel, with 1/8 the weight. ]



## ALCOA · ALUMINUM



# Eliminating Cold-End Errors

[[ A Subject of Vital Importance  
to Every Pyrometer User ]]

**T**HIS is a discussion of what happens when so-called "compensating" leads are used in the attempt to compensate the erratic E.M.F.'s. that arise at points (x) and (y) in the pyrometric diagram below.

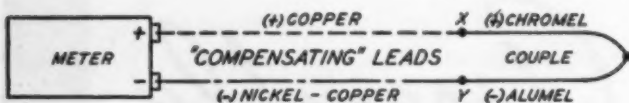


Fig. 1—Using "Compensating" Leads

The above shows the use of Copper vs. Nickel-Copper, generally employed where "compensating" leads are connected to Chromel-Alumel couples. Obviously, the junction (x) between Copper and Chromel, and the junction (y) between Nickel-Copper and Alumel, each represents a thermo-couple just as truly as does the hot-end of the Chromel-Alumel wires.

As such, these junctions (x) and (y) are two sources of E.M.F.'s. The E.M.F. generated at (x) acts in opposition to that of the hot-end of the couple, while the one at (y) acts as a booster on the couple. Therefore, the E.M.F.'s. at (x) and (y) oppose each other, and if they were of equal value (as they are supposed to be), the one would compensate for the other. Hence the term, "Compensating" Lead Wire.

It is somewhat commonly believed that these E.M.F.'s. at (x) and (y) actually do compen-

sate each other. But, with pyrometer instruments now made with an accuracy of  $\pm 1/5\%$  of their scale range, it might be well to see just how fine or coarse this compensation really is. If "compensating" leads happen *not* to compensate, that fact, of course, entirely nullifies the fine accuracy of the meter and of the Chromel-Alumel Couple.

Realizing that (x) and (y) represent the junctions between the lead wire and the couple, it is obvious that they are always in close proximity to the hot furnace in which the couple is inserted. Often they are *very* close and sometimes reach a temperature as hot as 300° F. If the "compensating" leads actually compensated, this temperature would have no significance. The fact is, they don't compensate, which introduces an error, as will now be shown.

Based on U. S. Bureau of Standards figures: At 300° F., Chromel vs. Copper (x) generates 3.07 M.V. and at 290° F., 2.94 M.V.

Based on published specification values for the Nickel-Copper combination: At 300° F., Alumel vs. Nickel-Copper (y) generates 3.51 M.V., and at 290° F., 3.38 M.V.

CASE I—So, if (x) and (y) are each at 300° F., it means that there are 3.07 M.V. at (x)

*Wilson  
(Met. Dept.)  
This is a  
bit technical  
for me, but I  
think you  
should  
investigate it.  
Why not send  
for a sample  
of these  
extension  
leads—  
and make  
your own  
test?  
"Chief"  
9-27-34*

opposing the E.M.F. of the couple, while there are 3.51 M.V. at (y) adding to the E.M.F. of the couple. These figures *should* be the same, but they are not, and the resultant error is their difference, or 0.44 M.V. equivalent to adding a plus error of 20° F.

Now let's assume (as is quite apt to be true) that (x) and (y) are not at the same temperature.

CASE II—Suppose that (x) is at 300° F. and (y) at 290° F. In this case, as above, 3.07 M.V. oppose the couple, while 3.38 M.V. add to it. This makes a plus error of 0.31 M.V. or 14° F.

CASE III—Now let (x) be at 290° F. and (y) at 300° F., the reverse of case II. This means 2.94 M.V. opposing the couple, with 3.51 M.V. boosting it—causing a plus error of still greater magnitude of 0.51 M.V., which is equivalent to making the meter read 26° too high.

Thus in the neighborhood of 300° F., a plus error exists ranging from 14° under the best conditions, to 26° in case of uneven heating of (x) and (y).

The above examples are based on sheer calculation, using E.M.F. values based in turn on published figures. So we ran an actual test, creating the above assumed conditions, and also explored a wider range. A stock Chromel-Alumel couple and a stock piece of Copper vs. Nickel-Copper lead wire were used. When (x) and (y) were each at 300° F., a plus error of 32° resulted, or 12° more than the calculated error shown above at Case I, and at 200° F., the error was 13°.

This illustrates how the usual "compensating" lead wire varies from its published values. And this is not to be wondered at, since the

Copper wire that's used is not made specifically for the job, nor is the Nickel-Copper. But, even if they met their published values, as proven above, they still introduce a serious error.

• • • •

THE above errors arising at (x) and (y) can be entirely eliminated by replacing these inaccurate "compensating" leads with EXTENSION LEADS, made of Chromel-Alumel, the same as the couple, as shown below.

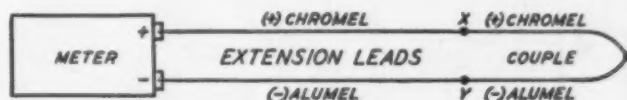


Fig. 2—Using EXTENSION Leads

The errors are eliminated because obviously, no disturbing E.M.F.'s. arise at either (x) or (y), since Chromel is joined to Chromel, and Alumel to Alumel. The lead wire in this case is not truly a lead wire, but is rather merely an extension of the couple; and thus the "cold-end" becomes located at the meter, where the "automatic cold-end compensator," used in all good instruments, takes care of the normal temperature fluctuations in the meter.

Finer and finer accuracy is being built into the meters of today, and finer and finer accuracy is being demanded and met, in Chromel-Alumel couples. But again we say, that all this close accuracy is nullified by the use of "compensating" leads that do not compensate.

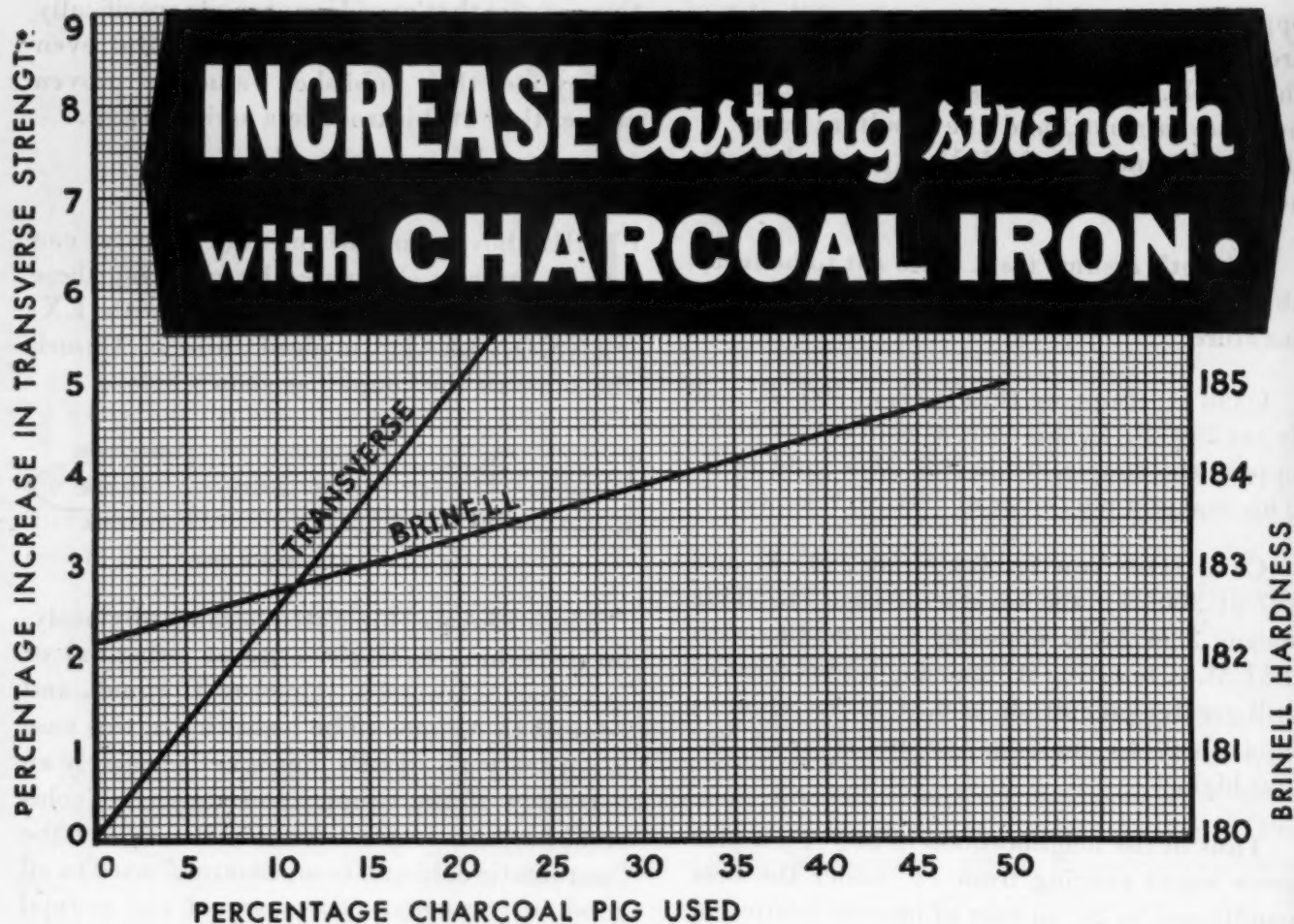
To get the full advantage of the improvement in accuracy of instruments and couples, use Chromel-Alumel Extension Leads with Chromel-Alumel Couples. They belong together.

HOSKINS MANUFACTURING CO.  
4437 LAWTON AVENUE DETROIT, MICHIGAN

# LEADS HOSKINS COUPLES

CHROMEL-ALUMEL





**A**N extended series of tests carried out in the foundry of a large automobile manufacturer was conducted to find out definitely just how much the use of charcoal iron would increase cylinder strength.

No alloys were used in any of the mixes during this investigation. All coke used had the same physical properties and cupola conditions were maintained as nearly constant as possible. Blast

You too can get stronger castings without added machining costs by the use of our pure charcoal pig iron. Write for suggestions on special cases.

pressure was not allowed to vary more than two ounces. The molten metal temperature at the spout varied from 2602°F. to 2678°F. and averaged 2652° for all heats.

The accompanying curves tell the story of what happened. It is a significant fact that as tensile strength increased, hardness showed practically no change. With a 12% increase in transverse strength, the Brinell hardness increased less than 3 points. There was practically no decrease in machinability in the stronger irons.

**Superior Charcoal Iron Company**  
Grand Rapids, Michigan

Debevoise-Anderson Co., Inc., Eastern Representative  
New York • Boston • Philadelphia

*Superior*  
**PURE CHARCOAL PIG IRON**



# DEPENDABLE

Just as daybreak surely follows the night—in a like measure of certainty users of strip steel have come to depend upon West Leechburg for strip steel of unvarying high quality. From day to day and year to year these manufacturers of stampings and metal products expect and get the uniformly good strip steel service which keeps their production departments running smoothly.

Are you interested in this kind of service?

We also roll and sell ALLEGHENY Stainless  
all grades in strip form.



## WEST LEECHBURG STEEL COMPANY

General Offices UNION BANK BLDG. PITTSBURGH, PA.

LOUIS • TOLEDO [Dean Higgins  
TORONTO ONT [Jessop Steel Co]  
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by  
OS T RYERSON & SON—CHICAGO

# MIDVALE



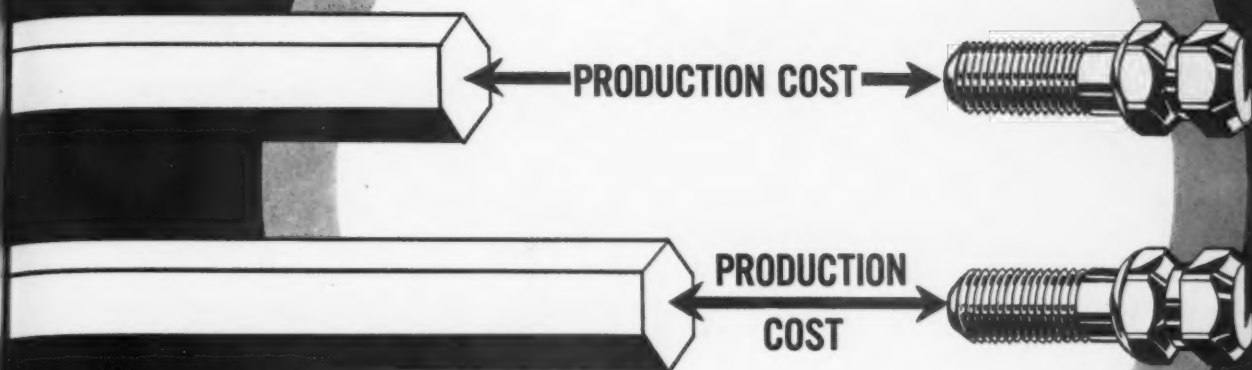
IN SPITE OF MODERN PROGRESS, THERE IS  
STILL PIONEERING IN STEEL

*You are invited to the  
MIDVALE EXHIBIT  
at the  
NATIONAL METALS  
EXPOSITION*

In the metal trades, the process industries—in fact, wherever unusual conditions must be met with permanency and strength—steel, or one of its alloys, still does the world's heavy duty. Midvale pioneered in the first alloys this nation ever saw—and is still pioneering today. True economy is never met except with genuine service. Genuine service is impossible without knowledge and experience. Midvale would like to serve you.

**THE MIDVALE COMPANY**  
NICETOWN, PHILADELPHIA

Offices: NEW YORK—CHICAGO—PITTSBURGH—WASHINGTON—CLEVELAND—SAN FRANCISCO



# SHORTEN THAT DISTANCE *between* THE STEEL AND THE FINISHED PART

**R**EDUCE the work and time required to transform steel bars into finished parts and you lower the final cost. This fundamental principle has not only created a large demand for steels that are cold drawn, but also for such cost reducing developments as Union Supercut, Union Hymo and Union Special Shapes.

All Union Cold Drawn Steels are accurate to size and shape and have a bright, smooth surface that requires no machining. Steels that are not cold finished must be machined all over to gain these features.

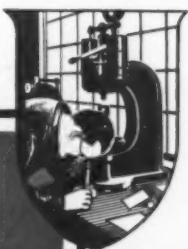
Union Supercut can be machined so much more rapidly than Bessemer screw stock (S.A.E. 1112) that hourly production of parts is radically increased.

Union Hymo offers high grade physical properties yet machines almost as rapidly as S.A.E. 1112. It also responds rapidly to carburizing.

Union Special Shapes are cold drawn to conform as closely as possible to the cross sections of the finished parts and thus eliminate many machining operations.

These are all cost reducing steels because they bring the steel you purchase closer to the completed job—closer when measured by the amount of work and time required for your operations. Shorten that distance between the steel and the finished part and thus reduce your costs.

UNION DRAWN STEEL CO., MASSILLON, OHIO



VIGILANT  
LABORATORY  
CONTROL





# UNION SPECIAL

## *The Guaranteed* CARBURIZING STEEL

**T**HIS straight carbon, low sulphur grade of carburizing steel offers striking advantages for the making of those parts which must put up strong, lasting resistance against shock, abrasion and wear.

Many manufacturers have found great satisfaction in knowing that 100% satisfactory parts can now be obtained when carburizing processes are properly conducted. Union Special Carburizing Steel not only eliminates the expense and annoyance of rejections but its improved machinability speeds up production. Compared with S.A.E. 1015 or 1020 it develops a more uniform hardness of case and a tougher, more ductile core. The requirements for uninterrupted, high quality production are so fully met that we have given it a "bar for bar" guarantee.

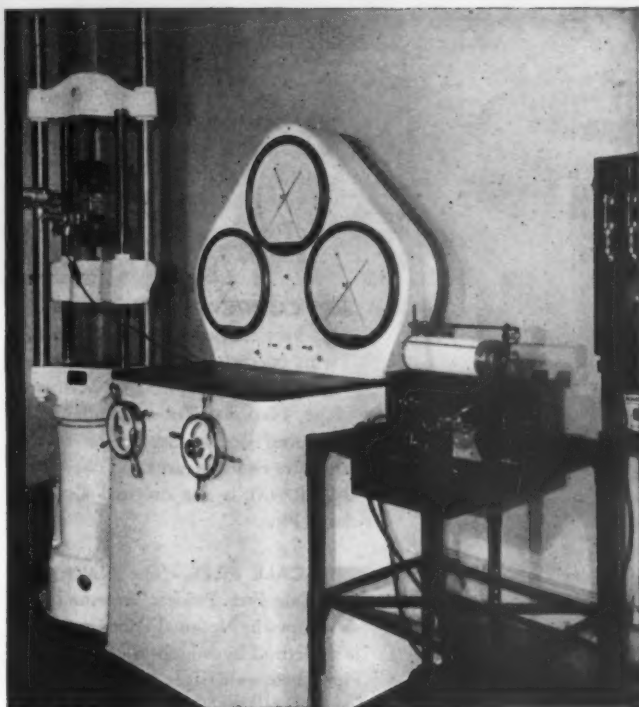
If you are not enjoying 100% satisfactory carburized parts, let us give you further information about this guaranteed carburizing steel.

**UNION DRAWN STEEL CO.**  
MASSILLON, OHIO

# UNION COLD DRAWN STEELS

**COLD DRAWING  
PROVIDES  
MAXIMUM  
MACHINABILITY**

*See this Outstanding*  
**SOUTHWARK TESTING EQUIPMENT**  
*at the 16th*  
**NATIONAL METAL EXPOSITION**  
**BOOTH 333**



**SOUTHWARK-EMERY UNIVERSAL  
HYDRAULIC TESTING MACHINE**

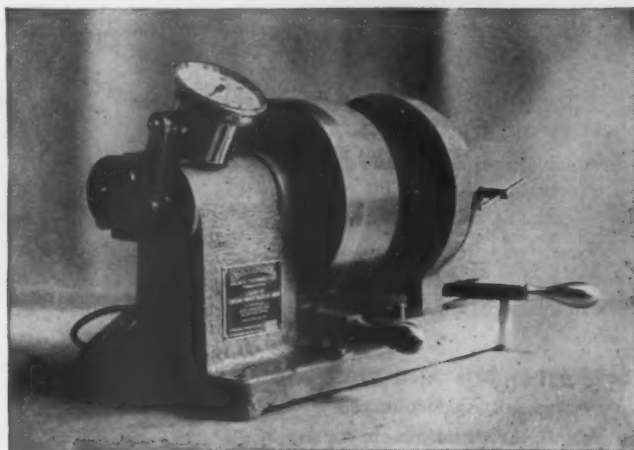
One of a complete line of hydraulic universal machines with which Southwark-Emery has achieved the position of leadership in the materials testing field.

Capacity 60,000 lbs. Designed for one man operation. Equally as well suited to high speed routine testing as to careful research work, as the dial indicating instruments and the inertialess weighing system permit load readings at fast testing speeds without sacrifice of accuracy, and a new form of hydraulic control makes speed adjustment rapid and accurate. Pulsationless load application, precise control of speed with infinite selectivity, the ability to hold loads or to apply loads by increments, or to operate with equal facility on either loading or unloading tests.

These and many other features invite your inspection. On display in connection with this machine will also be seen:

**THE SOUTHWARK STRESS-STRAIN RECORDER**

High-magnification stress-strain recorder—sturdy, compact, fool proof. Load recording by rotation of drum positively driven from the weighing system. Accuracy proportionately equal to dial readings. Strain record—strain multiplication of 250, 500 or 1000 by electro-mechanical method without distortion. Extensometer makes own gauge points. Easily attached. Sensitivity equal to the best dial indicating extensometers.



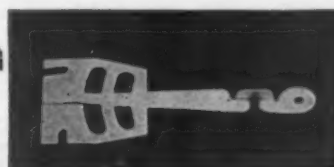
**CARPENTER TORSION IMPACT TESTING MACHINE**

The Torsion Impact Test fills in the gap left by the Izod Impact test where hard steels are concerned. It may even be used successfully for impact tests of glass and ceramics because it distributes the impact stress over the full area of the test piece in shear and becomes easily measurable. It is an impact test of any machine member which operates in torsion, such as axles, propeller shafts, etc. It is a direct test for machineability since it is a shear impact test and so is the machining operation.

Its extremely high sensitivity is an exact index of the proper heat treatment to obtain the best machining properties of a metal to be cut or, inversely, the best tool steel properties to insure longer tool life.

The Carpenter Torsion Impact Machine supplies a simple, inexpensive yet extremely accurate means of applying the Torsion Impact test in any laboratory.

**THE DE FOREST  
SCRATCH RECORDING  
STRAIN GAUGE**



An instrument the size of a latch key—that weighs only two grains—light and small enough to attach to rapidly moving parts such as high speed machinery or aeroplane propellers where there is high centrifugal force. This instrument may be used for high rates of vibration such as harmonics up to the sonic stage. It records deformations below the elastic limit of from 0.001 in. to 0.050 in., over a 2 in. gauge length. The record is permanent—in the form of a scratch in the exact size of the deformation, and is measured or photographed at suitable magnification under a metallographic microscope.

This instrument's low price permits its multiple use throughout a structure under test—thus giving a complete picture of occurring strains without the necessity for usual slow and tedious procedure.

**BALDWIN-SOUTHWARK CORP.  
SOUTHWARK DIVISION : PHILADELPHIA**

Pacific Coast Representatives: The Pelton Water Wheel Co.,  
San Francisco

# When you buy pipe, get ALL THESE ADVANTAGES

## **1 COMPLETE UNIFORMITY.**

Uniformity, in NATIONAL Pipe, means uniformity of metallic structure, of ductility, of strength, of resistance to corrosion. It also means uniformity of diameter, of wall-thickness, and of surface finish

## **2 STRENGTH AND DUCTILITY.**

Strength and ductility to a remarkable degree are inherent in the steel of NATIONAL Pipe. Striking demonstrations of this have occurred again and again where the pipe was violently distorted by accident or was under abnormal stress in service.

**3 THREADS EASILY.** Smooth, strong, easily made threads are a marked advantage in using NATIONAL Pipe. This is due to unvarying quality of metal and to absence of slag inclusions, laminations, and blisters

**4 FLANGES READILY.** Expanding and rolling back of the metal for flanging is a real test of any pipe. To do this without loss of material, time, or labor is an experience practical men appreciate.

**5 COILS AND BENDS WELL.** In making coils and bends, there is both satisfaction and profit in knowing that the pipe you use has an extra measure of strength and ductility to meet the demands of unusually close and exacting work.

**CHROMATE TREATMENT**—All NATIONAL Galvanized Pipe is given a special chromate treatment to resist discoloration and the formation of white rust. This patented process preserves that smooth glistening surface or metallic lustre which is characteristic of good galvanizing



**6 SOUND JOINTS.** Workmen in field and plant who have welded or coupled thousands upon thousands of joints on NATIONAL Pipe, enthusiastically endorse it as their choice.

**7 COPPER-STEEL.** To meet very definite needs in dealing with corrosion and thus to widen the range of service of NATIONAL Pipe, National Tube Company introduced Copper-Steel Pipe to the industry twenty years ago. Therefore, NATIONAL is the original Copper-Steel Pipe.

**8 SCALE FREE.** The NATIONAL Scale Free Process, invented and developed by National Tube Company, is a method by which all NATIONAL Pipe (butt-weld sizes  $\frac{1}{2}$  to 3-inch) is freed of mill-scale, inside and outside, leaving a clean, smooth surface.

**9 SPELLERIZED.** This is another NATIONAL process invented and developed by National Tube Company. Blooms for pipe, 4 inches and under, are subjected to a special roll-knobbling or hot-forging treatment which so works the surface metal as to eliminate any irregularities and to produce a uniform, dense surface.

**10 TESTED AND INSPECTED.** Tests and inspections, the most painstaking, most thorough and most conclusive that can be applied, are maintained throughout NATIONAL plants. The result is a product on which the user may fully and safely rely.

**NATIONAL TUBE COMPANY**

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

# NATIONAL PIPE





★ Into a great automobile plant rolled a first delivery of a Youngstown alloy steel. No fanfare accompanied its arrival--it went into the production schedule unheralded.

*... but it did not long retain its incognito*

Once the bars began to be fed to the machines, the questions rose promptly. "Where did this come from?"...."Why haven't we had this before?"...."Will we keep on getting it?"

When a shipment of steel can earn such a welcome from machinists, foremen, and superintendents alike, it is indisputable evidence of achievement.

Yes--the steel was different. Any mill could match its chemical specification but only the special mills developed and designed by Youngstown could assure it the uniformity of size and working qualities which it demonstrated.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

General Offices

Manufacturers of Carbon and Alloy Steels

YOUNGSTOWN, OHIO

See our exhibit at  
booth No. 498 at  
the National Metal  
Congress Exhibit

*Youngstown*

ALLOY AND  
SPECIAL STEELS

# The ONE TEST



## of A SPRING STEEL-SERVICE

### BOOTH 335

National Metal Exposition  
New York City  
Oct. 1st to 5th

Metallurgists of the Vanadium Corporation of America will be in attendance to answer your questions concerning Vanadium Spring Steels and to give you some interesting data on Normalloy Forgings and Manganese-Vanadium Castings, Forgings, Plates and Shapes.

Of the many steels that have been tried in spring service, only a few have survived and of these, no other steels approach the proved records of Chrome-Vanadium Steel in leaf spring service and Silicon-Vanadium in heavy coil spring applications.

VANADIUM CORPORATION OF AMERICA  
120 BROADWAY NEW YORK, N. Y.  
CHICAGO PITTSBURGH  
Bridgeville, Pa. DETROIT

Plants at Bridgeville, Pa., and Niagara Falls, N. Y.  
Research and Development Laboratories at Bridgeville, Pennsylvania



FERRO-ALLOYS  
of vanadium, silicon,  
chromium, titanium,  
and silico-manga-  
nese, produced by the  
Vanadium Corpora-  
tion of America, are  
used by steel makers  
in the production of  
high-quality steels.

# VANADIUM STEELS

*for strength, toughness and durability*



# NOW a NEW G-E Welding Electrode for Flat Welding at HIGH SPEED



*An application in a General Electric factory of Type W-23 electrode—welding the hydrogen-tight stator-frame extension of a 15,000-kv-a. hydrogen-cooled generator. Insert shows a close-up of one of the welds.*

## TYPE W-23 ELECTRODE will save you money

### *Because*

**IT INCREASES PRODUCTION.** On most work, the production rate is greater than with other heavily covered electrodes and two or three times that of bare or lightly fluxed electrodes.

**IT SAVES WELDING TIME.** Chipping or grinding of welds is seldom necessary, because they have a uniform, smooth surface.

**IT PRODUCES WELDS OF HIGHEST QUALITY.** W-23 welds are unexcelled in tensile strength, ductility, density, and resistance to impact or corrosion.

**IT CAN BE USED MANUALLY OR AUTOMATICALLY** and produces equally good results with either alternating or direct current.

The nearest G-E welding distributor will gladly give you a sample of Type W-23 or complete information about it. Or, write to the nearest G-E Office, or General Electric Company, Schenectady, N. Y.

And now, don't fail to read the important announcement on the following pages.

150-28

# GENERAL ELECTRIC



# Announcing

**T**HIS improved G-E self-stabilized, self-excited welder establishes new standards of modern welding equipment. It is designed as a complete welding unit, incorporating all the desirable characteristics necessary for long, satisfactory, trouble-free operation.

**IT WILL PRODUCE SUPERIOR WELDS . . .** and therefore a better product with fewer rejects.

Its performance is as satisfactory with bare or lightly coated electrodes as with heavily coated electrodes. This is the result of adequate **self-stabilization**.

The generator has that stability of arc, together with the rapid voltage recovery known as "pep," which makes the arc respond instantly to changes in welding conditions, without sluggishness or "over-shooting."

**IT SAVES TIME . . .** superior welds can be made more quickly and more easily.

The polarity can be reversed instantly and positively by the simple movement of a handle on the control panel, which reverses the current in the welding leads.

The sets can be readily moved, either by slings from a crane or by means of a strong, three-wheel running gear. They are light in weight, and have adequate road clearance and low center of gravity—one wheel can pass over an obstruction 10 inches high without overturning the set.

**IT SAVES MAINTENANCE EXPENSE . . .** through minimum outlay for repairs with maximum use of equipment.

All auxiliary, power-consuming, external devices, such as reactors, resistors, and excitors, have been eliminated by the improved, exclusive, G-E design.

The set is designed to stand abuse and to give long, trouble-free service. Protection against weather and falling objects is provided by suitable covers. Lubrication is required but once a year.

**IT IS POPULAR WITH THE WELDING OPERATOR . . .** its improved performance gives increased confidence.

He can readily obtain the proper welding current at the most desirable open-circuit voltage by means of the independent control of voltage and current.

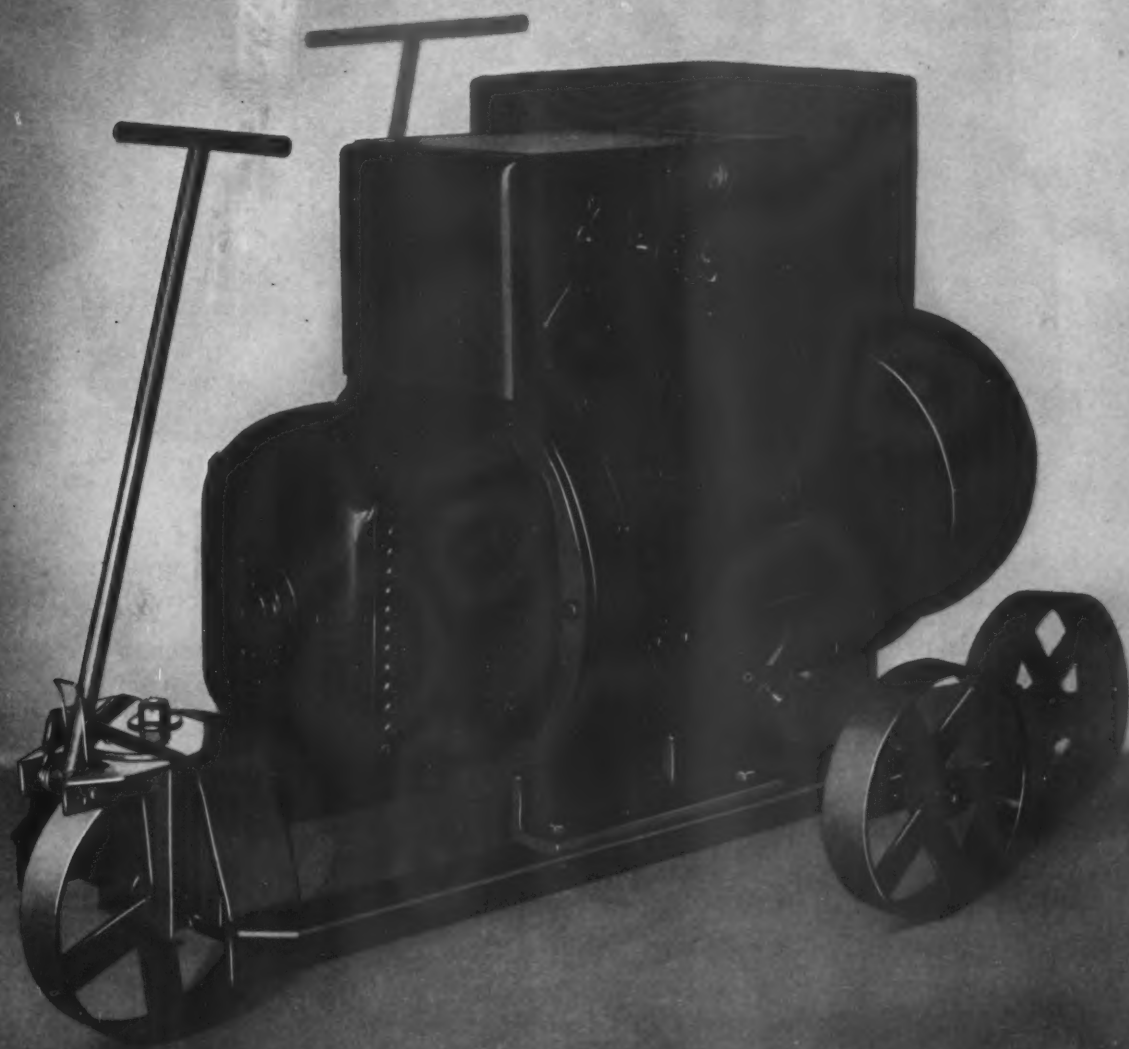
All handles, knobs, and buttons are large and are easily grasped, even with a gloved hand. The control panel is located at a convenient height. The panel is dead-front; there are no exposed connections.



You can obtain this improved G-E welder in a variety of types—motor-driven, gas-engine-driven, and belt-driven sets. Ask the nearest G-E welding distributor for complete information, or write to the nearest G-E Sales Office. General Electric Company, Schenectady, N. Y.

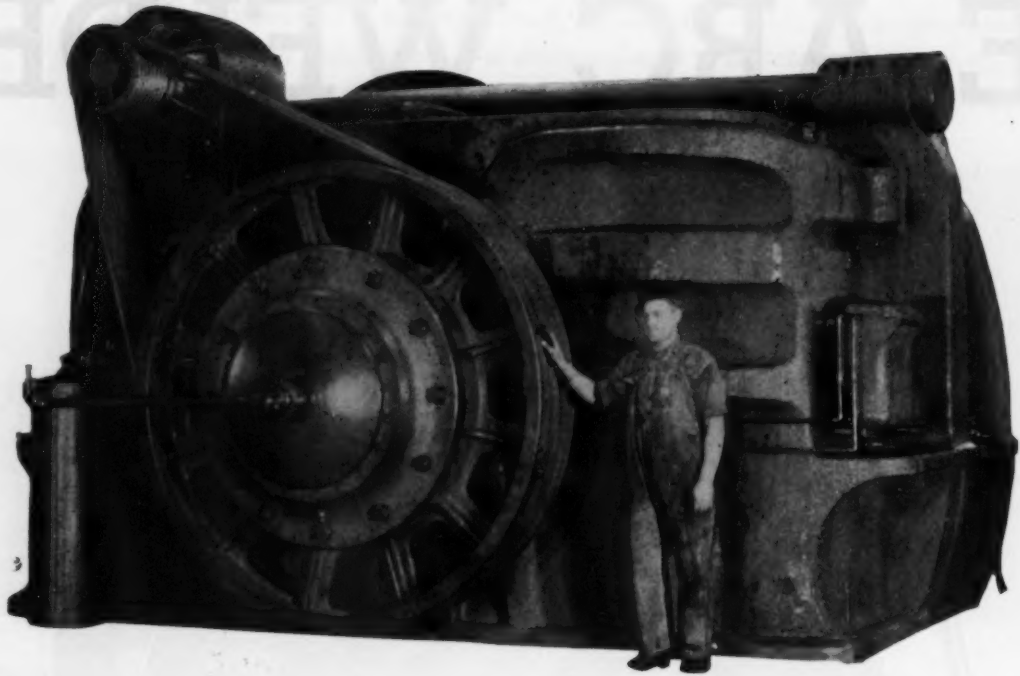
**G E N E R A L**

# *an Improved* **G-E ARC WELDER**



**E L E C T R I C**

# National announces a new Air Clutch



NATIONAL FORGING MACHINES can now be supplied with a new simplified air operated friction clutch as alternate equipment for the regular quadruple abutment starting and stopping clutch.

This provides a quick-acting, smooth and quiet driving mechanism, and eliminates all noise and shock. Its multiple discs are of unusually large area to lessen unit pressure and maintain a low operating temperature.

The National "Friction-Slip Relief" permits the use of an over-size air clutch which need not serve the double purpose of a driving means and a relieving mechanism, as generally employed.

This clutch is also available for National Forging Machines now in service.

*National High Duty Forging Machines are sold by*

**CHAMBERSBURG-NATIONAL**

COMPLETE FORGING EQUIPMENT

CHAMBERSBURG, PA.  
NEW YORK, 152 WEST 42ND STREET

CHICAGO, 565 WEST WASHINGTON ST.


TIFFIN, OHIO  
DETROIT, BOOK BUILDING

THE NATIONAL MACHINERY CO.

TIFFIN, OHIO





**BOULDER DAM — THE GREATEST IRRIGATION PROJECT THE WORLD HAS EVER SEEN. BEDDED DEEP INTO ITS MIGHTY STRUCTURE, AS WELL AS INTO A GREAT DEAL OF THE EQUIPMENT USED IN ITS CONSTRUCTION, ARE MILLIONS OF CLEAN, ACCURATE HOLES MADE WITH "CLEVELAND" TWIST DRILLS AND REAMERS. STAMPED ON EACH TOOL WAS THIS SYMBOL  . IT IS NEVER SEEN IN THE FINISHED PROJECT, BUT IT IS TREMENDOUSLY IMPORTANT TO ENGINEERS WHO STRIVE FOR PERFECTION IN RESULTS.**

\* \* \* \* \*

**THE CLEVELAND TWIST DRILL COMPANY, *Cleveland, Ohio, U. S. A.***  
**BRANCHES IN NEW YORK, CHICAGO, DETROIT, SAN FRANCISCO, LONDON**



## *There's Gold in Metal Cleaning*



★ Panning gold in a mountain stream is a much more difficult way to make money than reducing metal cleaning costs. And in reducing these costs the efficiency and economy of the metal cleaner you use are of primary importance. ★ Here are the ways in which Wyandotte Metal Cleaners will save you money. Less Wyandotte is needed to do efficient cleaning, which saves money for you. It keeps its strength in solution over longer periods of time, requiring less frequent re-charging of the cleaning tanks,—still another saving. ★ Wyandotte cleans so clean that there are fewer rejects. And it works so dependably that time allowances can be met more easily. Wyandotte will show you lower cleaning costs per thousand pieces cleaned. ★ Ask for a Wyandotte Service Representative to demonstrate these facts in your own plant.

THE J. B. FORD COMPANY, WYANDOTTE, MICHIGAN

**Wyandotte**  
Metal Cleaners

# Install VENTURAFIN UNITS ... THEN FORGET THEM!!



Venturafin Unit Heaters are specially designed for factories, shops, garages, stores, oil stations, gymnasiums, offices, bowling alleys, billiard rooms, theaters, lobbies, etc.

## YEAR... AFTER... YEAR THEY'LL GIVE YOU TROUBLE-FREE AND EFFICIENT HEATING AT NEW LOW COST—BECAUSE THEY'RE DESIGNED RIGHT

Your heating troubles are over once you install Venturafin Unit Heaters. They insure quick heating, even heating and economical heating. They are a scientifically designed and correctly engineered job, so that you can think of first cost as final. You don't pay and pay endlessly to keep the system in shape. Laboratory and actual field tests plus years of satisfactory operation have taken the "bugs" out of Venturafin equipment. No one is experimenting on you. And it's a great advantage that Venturafin is up off the floor out of your way. Phone the nearest Heating and Piping contractor, or write direct to the factory for complete data.

**AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN**  
**CANADIAN SIROCCO CO., LIMITED, WINDSOR, ONTARIO**  
**BRANCH OFFICES IN ALL PRINCIPAL CITIES**  
*Division of American Radiator and Standard Sanitary Corporation*



The most complete sound testing equipment in the industry is at the command of American Blower Engineers—that's why Venturafin Unit Heaters are quieter in operation.



Install Venturafin Unit Heaters in any out of the way location and force heated air where you want it and as much as you want. 10 sizes for a wide range of applications.



Venturafin Unit Heaters are built by an organization of skilled engineers with a background of over 50 years' experience in air handling and air conditioning work.

H E A T                      W I T H                      U N I T                      H E A T E R S

## American Blower

VENTILATING, HEATING, AIR-CONDITIONING, DRYING, MECHANICAL DRAFT  
DIVISION OF AMERICAN RADIIATOR AND STANDARD SANITARY CORP.

AMERICAN BLOWER CORPORATION, 6000 Russell Street, Detroit, Mich.  
Please send complete data on Venturafin Unit Heaters to:

Name \_\_\_\_\_ Firm Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ (1315)



# Full finished means finished all over to us



**H**EADS, points and shanks of Cleveland Cap Screws are full finished—and the Kaufman Process, (patented) our own plant development, provides a full finished thread as well. So when we say that Cleveland Cap Screws are 'full finished,' we intend for you to take it literally. You can expect these fine cap screws to meet your specifications, of course. Exacting accuracy

is maintained in every detail. Frequent inspections insure *that*. And as for service—*thirty million* Cleveland Cap Screws are stocked at the factory and our five warehouses, *for you*.

**THE CLEVELAND CAP SCREW COMPANY**  
2930 E. 79th St., Cleveland, Ohio

Address Our Nearest Warehouse: SAN FRANCISCO . 243 Vallejo St.  
CHICAGO, 726 W. Washington Blvd. NEW YORK . . . 47 Murray Street  
PHILADELPHIA . 12th & Olive Sts. LOS ANGELES . 1015 E. 16th Street

**CLEVELAND CAP SCREWS**

# It used to be hard to get

but now we buy this *High Carbon Flat Wire* from ROEBLING



ONCE upon a time it may have been difficult to obtain domestic Cold Rolled High Carbon Steel Flat Wire of high grade. But certainly not now.

At Roebling the art of making this wire has been brought to a high stage of development. You can get spring steel from Roebling to meet exacting specifications.

There is most convincing proof of this. It is the fact that many of the

most careful purchasers of this product...whose requirements are very severe...have over a period of years bought cold rolled high carbon flat wire from Roebling and continue to buy it.

Tell us what your specifications are. Let us figure on them. We are confident that you would be highly pleased with the quality of our flat wire as well as the advantages of our close, interested cooperation.



Roebling Cold Rolled Flat Wire is made from both high carbon and low carbon steels, produced in Roebling's own mills.

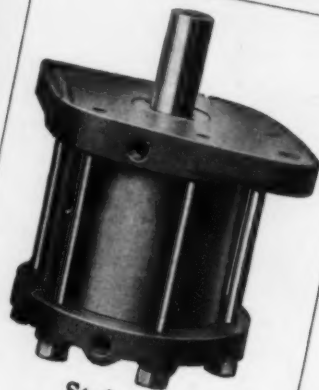
The high carbon flat wire is available in tempered and untempered types.

*Finishes:*—bright, black annealed, bright annealed, tinned, japanned, galvanized, blued, straw-colored, coppered.

JOHN A. ROEBLING'S SONS COMPANY  
TRENTON, N. J. *Branches in Principal Cities*

**ROEBLING Cold Rolled Steel FLAT WIRE**

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING



Style 2

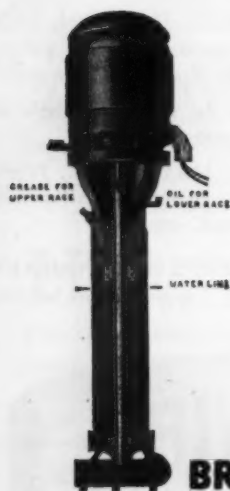
### INSTRUMENTAL...

In raising machine tool efficiency to the highest possible point — available in styles and capacities to suit your installation, you can be sure of excellent results when you use—

## "HOPKINS" NON-ROTATING CYLINDERS

THE TOMKINS-JOHNSON COMPANY  
628 N. MECHANIC STREET JACKSON, MICHIGAN

write for  
catalog



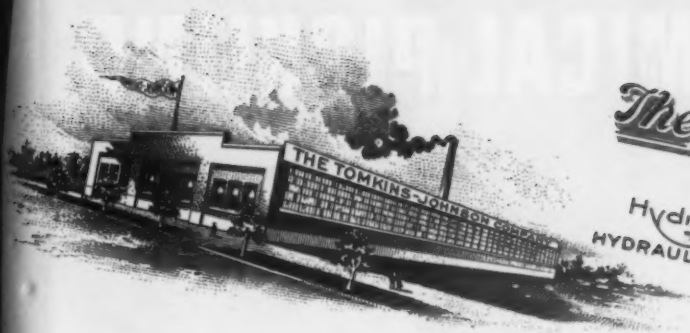
### EFFICIENCY.....

To speak of an efficient pump is to speak of the Brownie Pump. Designed and made to have exceptionally large capacities with surprisingly low horse power input required. Write for Bulletin No. 10 which gives specifications on the various sizes, types and features which are found only in the

## BROWNIE COOLANT PUMP

THE TOMKINS-JOHNSON COMPANY  
628 N. Mechanic Street, Jackson, Michigan





**The TOMKINS-JOHNSON COMPANY**



MANUFACTURERS OF

**"HOPKINS"**  
PREFERRED  
EQUIPMENT

CHUCKS, CYLINDERS,  
VISES AND VALVES



DIE SINKING  
MILLING CUTTERS

Hydro-Grip  
HYDRAULIC CHUCK

**JACKSON, MICHIGAN**

September 10, 1934

The Iron Age  
239 West 39th Street  
New York, N.Y.

Gentlemen:

You might be interested in knowing that we are sold on The Iron Age as an advertising medium. My bringing up the subject was prompted by a letter we recently received from a small tool manufacturer who asked us what results we are getting from our advertisements in the editorial section of The Iron Age.

The following is a copy of our reply to the small tool manufacturer:-

"Referring to your letter of August 22, regarding our advertisement in The Iron Age, we were not sold on advertising in this magazine for a good many years thinking it not suitable for our business. Wish to say that we have been advertising in The Iron Age this year and have more answers from the advertisements than from any other."



Yours very truly,  
THE TOMKINS-JOHNSON CO.

*H.A. Tomkins*

H.A. Tomkins  
Pres. & Gen. Mgr.

AT:LE

# EFFICIENT-ECONOMICAL PICKLING



.... LIQUID INHIBITOR

## DON'T WONDER...*KNOW!*

**A**RE you able to say that your pickling room is operating efficiently ...that your acid consumption and over-all costs are at a minimum?

If not, consider the use of Grasselli 8 Liquid Inhibitor and in connection with its use, Grasselli Steel Service.

Each represents a valuable aid to your pickling operations. The cost of Grasselli 8 Liquid Inhibitor averages from 1c to 2c per ton

of material pickled. THERE IS NO COST for the use of Grasselli Steel Service.

### GRASSELLI STEEL SERVICE

Not a name but a complete all-around laboratory and plant pickling service ... maintained for the purpose of servicing our products and your problems. We ask you to make use of it.

Write for Interesting Booklet

**THE GRASSELLI CHEMICAL CO.**  
INCORPORATED  
Founded 1839 CLEVELAND, OHIO



**GRASSELLI... THE ANSWER TO YOUR PICKLING PROBLEM**

# RADIO ENTERTAINMENT

as you like it!

*Good News!*



Returns to the

air Sept. 30 in another brilliant series of radio broadcasts

over the NBC Red Network



27 stations in

all featuring  the celebrated ARMCO

BAND, directed by Frank Simon, one of America's greatest



bandmasters. And that perennial favorite of the air

waves, the Armco Ironmaster  in a series of friendly

topical talks about iron and steel, "the master of

them all." Tune in for these weekly Sunday Night

broadcasts at 6:30 P. M. Eastern Standard Time.

*And remember* that Armco makes 307 different grades of special iron and steel sheets, including Armco INGOT IRON and Armco STAINLESS STEEL—a grade for your every exacting purpose. What is your problem, your need?

**THE AMERICAN ROLLING MILL COMPANY • MIDDLETOWN, OHIO**



# P.M.G. METAL CASTINGS

(A Silicon Bronze)

Low Material Cost  
Durability  
Maximum Strength

## High Quality Gear Castings



Group of Castings Made of P.M.G. Metal

Send for your copy of our P.M.G. Metal folder which contains in detail the uses of this unusual alloy.

CRAMP BRASS AND IRON FOUNDRIES COMPANY  
PASCHALL STATION PHILADELPHIA, PA.

## "A.W." DIAMOND PATTERN FLOOR PLATE

"A.W." DIAMOND PATTERN FLOOR PLATE is a scientifically designed Steel product, used where a safe, nonslip and durable surface is demanded. This is rolled in thickness from  $\frac{1}{8}$ " to 1". In widths up to 72" and lengths to 300".

"A.W." DIAMONDETTE PATTERN FLOOR PLATE was developed along similar lines, but to meet the needs for light sections, thus effecting a saving of weight without the sacrifice of efficiency. This is rolled in thickness from  $\frac{3}{8}$ " to \*No. 24 Gauge. In widths up to 60" and lengths to 240".

*Descriptive Folders mailed upon request*

BLUE ANNEALED SHEETS  
SHEARED PLATES BILLETS, SLABS  
SWEDE PIG IRON CARBON AND ALLOY STEELS  
\*No. 16 to No. 24 gauge—Exclusive Patented Process  
108 YEARS IRON AND STEEL MAKING EXPERIENCE

ALAN WOOD STEEL CO.  
Conshohocken, Pennsylvania

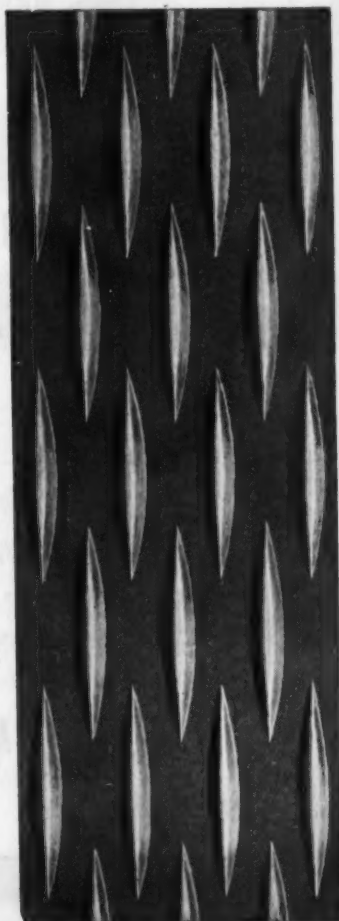
Philadelphia  
New York  
Houston



Seattle  
San Francisco  
Los Angeles



STANDARD DIAMOND  
Actual Size



DIAMONDETTE  
Actual Size

## A.B.C. STRUCTURES IN CHICAGO

*"City of Progress"*



A—333 North Michigan Ave. Building  
B—Carbide & Carbon Building  
C—Pure Oil Building  
D—Wrigley Building Addition  
E—Tribune Tower Building

**M**ICHIGAN Avenue in the heart of downtown Chicago, teeming with traffic, is carried over the Chicago River on a double-deck bridge of bascule type. This imposing steel structure in the midst of buildings that are modern, substantial, and architecturally pleasing, was fabricated by American Bridge Company; nor is it an isolated example. Within the field of the camera, five of the splendid towers that pierce the sky are dependent for strength and rigidity on framework of ABC-fabricated steel.

This relatively small cross section,—visual evidence of the extent of American Bridge Company activities in one great city,—finds its counterpart in many another throughout the United States.

## AMERICAN BRIDGE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

General Office: Frick Building, Pittsburgh, Pennsylvania

Contracting Offices: Baltimore, Boston, Chicago, Cincinnati, Cleveland, Denver, Detroit, Duluth, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Salt Lake City.



Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco — Export Distributors: United States Steel Products Company, New York



# YALE ..... the best chain hoist ... the easiest to buy

When you buy hoisting equipment two factors are important . . . QUALITY and SERVICE—

**QUALITY** . . . Yale Chain Hoists are noted throughout the world of industry for their greater speed, strength, power and long life.

**SERVICE** . . . Your Yale distributor is no farther away from you than your telephone. The country's leading industrial supply houses are Yale distributors and they are located in every large industrial center.

Yale distributors carry adequate stocks of hoists and parts. They realize that Yale is the safest and most efficient hoist and, therefore, the easiest to sell—and they have made YALE THE EASIEST HOIST FOR YOU TO BUY.

Made by the world's oldest and largest manufacturers of chain hoists—Yale Ball Bearing Spur Geared Chain Hoists are "FROM HOOK TO HOOK A LINE OF STEEL."

THE YALE & TOWNE MANUFACTURING CO.

Philadelphia Division  
Philadelphia, Pa., U. S. A.

Makers of Yale Electric Trucks, Hand Lift Trucks,  
Hand Chain Hoists, Electric Hoists and Trolleys.

## These Are 13" Bars— They Cut Without Waste



THE machinist can cut multiples of standard bushing lengths from a Bunting machined and centered bronze bar without excessive waste. Also sufficient stock is provided on the O.D. to permit machining to the size stamped on the bar. There are 116 stock sizes, cored and solid. Write for list, or ask any leading mill supply wholesaler.

## The Babbitt With The Lowest Coefficient Of Friction



NO other babbitt in today's market provides the anti-friction qualities of Bunting Babbitt. Scientific production control assures absolute uniformity in every bar and every shipment. Bunting Babbitt requires a minimum of oil only and is not easily affected by lubrication neglect. Buy it of any leading mill supply wholesaler.

## "Ready Made" Bushings For Practically All Applications



THERE are over 500 different sizes of completely machined and finished Bunting Bronze bushings and bearings available from stock at all times, ready for assembly in all machinery and electrical equipment units. The range of sizes covers every usual need. A glance at the Bunting "Ready Made" list often saves time and labor. Write for it.



The Bunting Brass & Bronze Company  
Toledo, Ohio


BRANCHES and WAREHOUSES  
New York, Brooklyn, Newark, N. J., Boston, Philadelphia,  
Cleveland, Cincinnati, Detroit, Chicago, Minneapolis, St. Louis,  
Dallas, Kansas City, Los Angeles, San Francisco, Seattle.  
Export Office: Toledo, Ohio


# BUNTING

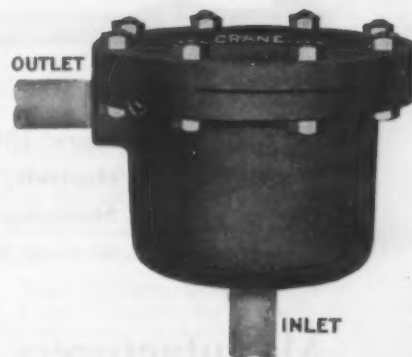
**QUALITY**  
BUSHINGS · BEARINGS · BARS · PARTS  
ANTI-FRICTION BABBITT



★ THIS INEXPENSIVE TRAP SAVES FUEL, TIME AND EQUIPMENT...  
AWAY WITH CONDENSATE!



 You pay for steam—dry steam. The moment condensate develops your returns from this steam begin to drop. It doesn't matter whether you want this steam to heat or to operate equipment. Accumulated condensate is costly and dangerous. The simplest, least-costly insurance lies in Crane Inverted Open Float Steam Traps. See that *enough* traps are used—see, too, that they are properly located in the line and in operating order. Crane Traps handle condensate from piping, coils, heaters and steam-heated equipment—for every type of unit. They are fully *automatic*. Figure their low cost out in savings and you'll find that steam traps pay for themselves *many times over* in a single year! Don't take it for granted that your steam traps are functioning...investigate your steam lines *frequently*. Crane Inverted Float Steam Traps show up their saving in *lower* fuel consumption.



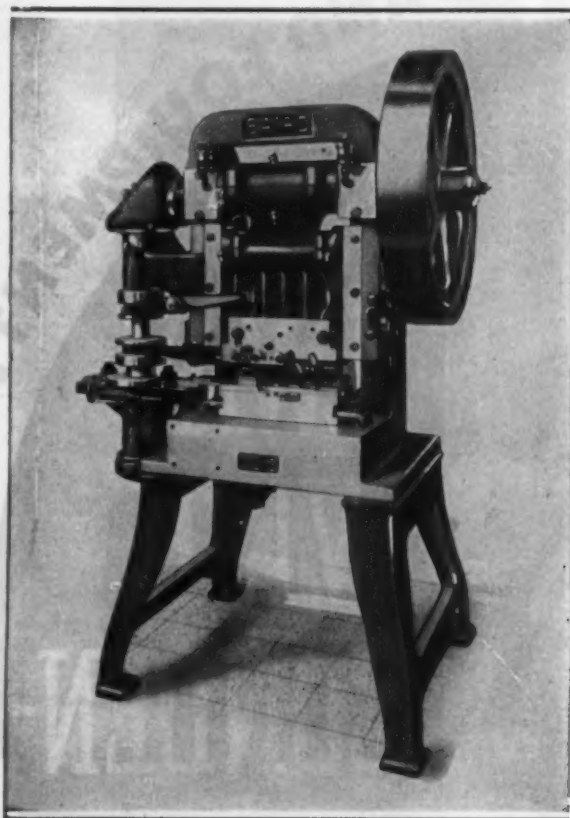
Crane No. 98I Trap of Cast Iron, for steam working pressures up to 200 lbs.  $\frac{1}{2}$ "— $\frac{3}{4}$ "—1"

# CRANE

CRANE CO., GENERAL OFFICES: 836 S. MICHIGAN AVE., CHICAGO, ILLINOIS • NEW YORK: 23 W. 44TH STREET

*Branches and Sales Offices in One Hundred and Sixty Cities*

VALVES, FITTINGS, FABRICATED PIPE, PUMPS, HEATING AND PLUMBING MATERIAL



## A New Aid to Stamping Production

For more than 60 years Baird has successfully designed and built all kinds of standard and special presses needed in the quantity production of articles made from ribbon metal. Out of this close contact with manufacturers' stamping problems comes a new Baird machine—the Automatic Multiple Transfer Press. It performs several operations on the same stamping.

### **AUTOMATIC MULTIPLE TRANSFER PRESSES**

Mount a coil of metal on the reel at the rear, and the press does the rest. A slide feed with sensitive screw adjustment feeds the metal very accurately. Transfer fingers retain their hold on the blank until it is in contact with the punch at each succeeding station, assuring positive and accurate transfer. Pilot pins are not needed in most cases.

Punches may be quickly and individually adjusted. The punches, dies, transfer slide and fingers all come out as a unit, and therefore changing the tool setup for a different job is accomplished in a very few minutes.

This new automatic press gives you the utmost in production, and yet it is quickly and easily set up. Six sizes are available for strips  $1\frac{1}{2}$ " to 6" in width. Submit samples for a production estimate.

*"Ask Baird About It"*

**THE BAIRD MACHINE CO.**

BRIDGEPORT, CONN.

# METAL STAMPINGS



Since 1896 the Crosby plant has been devoted, exclusively, to designing and producing Sheet Metal Stampings. Avail yourself of this experience. Send us your next stamping problem and watch results.

Manufacturers of "IDEAL" TROLLEY WHEELS

**THE CROSBY COMPANY**

General Offices and Works: BUFFALO, NEW YORK

Branch Offices: Chicago Detroit Cleveland New York Philadelphia Pittsburgh

# High Speed Vertical



Many advanced features for operating convenience, productive efficiency and safety

32 Speed Changes, 20 to 1300 R.P.M. with Broadened Back Gear Range to 150 R.P.M.

32 Feed Changes, 7/16" to 62" per min. controlled from Front or Rear.

Motor Drive or Belt Drive.



Ask for details

Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

## No. 2 HIGH SPEED VERTICAL SPINDLE MILLING MACHINE

BROWN & SHARPE

### ABRASIVE SURFACE GRINDER

Either Horizontal or Vertical Spindle Type  
Countershaft or Motor Drive

Get our bulletin for particulars

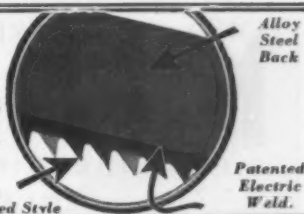
ABRASIVE MACHINE TOOL CO., East Providence, R. I.

### Positively Unbreakable!

#### MARVEL High-Speed-Edge HACK SAW BLADES

Specify MARVEL Blades for more cuts... for uninterrupted production... for safety... they're shatterproof. Every good feature; none of them bad. Write for circular.

ARMSTRONG-BLUM MFG. CO. Genuine 18% Tungsten High-Speed Steel  
349 N. Francisco Ave., Chicago



### LELAND-GIFFORD COMPANY

Worcester, Mass.

Drilling Machinery

Belt and Motor Spindle

One to Six Spindles

Tapping Attachments and Multiple Heads

### IF A COMPANY IN YOUR LINE

has found a better way of doing a thing, the probabilities are that your business paper tells about it.

## Safe and Dependable!

NATIONAL SAFETY COUNCIL, INC., PLACES CLIPPER LACING EQUIPMENT FIRST ON 1933 HONOR ROLL

MISCELLANEOUS METAL PRODUCTS INDUSTRIES (Continued)

1933 Injury Records of Individual Industrial Units

Key No.	Hours Worked (Thousands)	Average Number of Employees	NO. DISABLING INJURIES			TOTAL	NUMBER OF DAYS LOST			TOTAL
			Death	Permanent Partial	Temporary		Death	Permanent Partial	Temporary	
1	100	100	0	0	0	0	0	0	0	0
2	150	150	0	0	0	0	0	0	0	0
3	200	200	0	0	0	0	0	0	0	0
4	250	250	0	0	0	0	0	0	0	0
5	300	300	0	0	0	0	0	0	0	0
6	350	350	0	0	0	0	0	0	0	0
7	400	400	0	0	0	0	0	0	0	0
8	450	450	0	0	0	0	0	0	0	0
9	500	500	0	0	0	0	0	0	0	0
10	550	550	0	0	0	0	0	0	0	0
11	600	600	0	0	0	0	0	0	0	0
12	650	650	0	0	0	0	0	0	0	0
13	700	700	0	0	0	0	0	0	0	0
14	750	750	0	0	0	0	0	0	0	0
15	800	800	0	0	0	0	0	0	0	0
16	850	850	0	0	0	0	0	0	0	0
17	900	900	0	0	0	0	0	0	0	0
18	950	950	0	0	0	0	0	0	0	0
19	1000	1000	0	0	0	0	0	0	0	0
20	1050	1050	0	0	0	0	0	0	0	0
21	1100	1100	0	0	0	0	0	0	0	0
22	1150	1150	0	0	0	0	0	0	0	0
23	1200	1200	0	0	0	0	0	0	0	0
24	1250	1250	0	0	0	0	0	0	0	0
25	1300	1300	0	0	0	0	0	0	0	0
26	1350	1350	0	0	0	0	0	0	0	0
27	1400	1400	0	0	0	0	0	0	0	0
28	1450	1450	0	0	0	0	0	0	0	0
29	1500	1500	0	0	0	0	0	0	0	0
30	1550	1550	0	0	0	0	0	0	0	0
31	1600	1600	0	0	0	0	0	0	0	0
32	1650	1650	0	0	0	0	0	0	0	0
33	1700	1700	0	0	0	0	0	0	0	0
34	1750	1750	0	0	0	0	0	0	0	0
35	1800	1800	0	0	0	0	0	0	0	0
36	1850	1850	0	0	0	0	0	0	0	0
37	1900	1900	0	0	0	0	0	0	0	0
38	1950	1950	0	0	0	0	0	0	0	0
39	2000	2000	0	0	0	0	0	0	0	0
40	2050	2050	0	0	0	0	0	0	0	0
41	2100	2100	0	0	0	0	0	0	0	0
42	2150	2150	0	0	0	0	0	0	0	0
43	2200	2200	0	0	0	0	0	0	0	0
44	2250	2250	0	0	0	0	0	0	0	0
45	2300	2300	0	0	0	0	0	0	0	0
46	2350	2350	0	0	0	0	0	0	0	0
47	2400	2400	0	0	0	0	0	0	0	0
48	2450	2450	0	0	0	0	0	0	0	0
49	2500	2500	0	0	0	0	0	0	0	0
50	2550	2550	0	0	0	0	0	0	0	0
51	2600	2600	0	0	0	0	0	0	0	0
52	2650	2650	0	0	0	0	0	0	0	0
53	2700	2700	0	0	0	0	0	0	0	0
54	2750	2750	0	0	0	0	0	0	0	0
55	2800	2800	0	0	0	0	0	0	0	0
56	2850	2850	0	0	0	0	0	0	0	0
57	2900	2900	0	0	0	0	0	0	0	0
58	2950	2950	0	0	0	0	0	0	0	0
59	3000	3000	0	0	0	0	0	0	0	0
60	3050	3050	0	0	0	0	0	0	0	0
61	3100	3100	0	0	0	0	0	0	0	0
62	3150	3150	0	0	0	0	0	0	0	0
63	3200	3200	0	0	0	0	0	0	0	0
64	3250	3250	0	0	0	0	0	0	0	0
65	3300	3300	0	0	0	0	0	0	0	0
66	3350	3350	0	0	0	0	0	0	0	0
67	3400	3400	0	0	0	0	0	0	0	0
68	3450	3450	0	0	0	0	0	0	0	0
69	3500	3500	0	0	0	0	0	0	0	0
70	3550	3550	0	0	0	0	0	0	0	0
71	3600	3600	0	0	0	0	0	0	0	0
72	3650	3650	0	0	0	0	0	0	0	0
73	3700	3700	0	0	0	0	0	0	0	0
74	3750	3750	0	0	0	0	0	0	0	0
75	3800	3800	0	0	0	0	0	0	0	0
76	3850	3850	0	0	0	0	0	0	0	0
77	3900	3900	0	0	0	0	0	0	0	0
78	3950	3950	0	0	0	0	0	0	0	0
79	4000	4000	0	0	0	0	0	0	0	0
80	4050	4050	0	0	0	0	0	0	0	0
81	4100	4100	0	0	0	0	0	0	0	0
82	4150	4150	0	0	0	0	0	0	0	0
83	4200	4200	0	0	0	0	0	0	0	0
84	4250	4250	0	0	0	0	0	0	0	0
85	4300	4300	0	0	0	0	0	0	0	0
86	4350	4350	0	0	0	0	0	0	0	0
87	4400	4400	0	0	0	0	0	0	0	0
88	4450	4450	0	0	0	0	0	0	0	0
89	4500	4500	0	0	0	0	0	0	0	0
90	4550	4550	0	0	0	0	0	0	0	0
91	4600	4600	0	0	0	0	0	0	0	0
92	4650	4650	0	0	0	0	0	0	0	0
93	4700	4700	0	0	0	0	0	0	0	0
94	4750	4750	0	0	0	0	0	0	0	0
95	4800	4800	0	0	0	0	0	0	0	0
96	4850	4850	0	0	0	0	0	0	0	0
97	4900	4900	0	0	0	0	0	0	0	0
98	4950	4950	0	0	0	0	0	0	0	0
99	5000	5000	0	0	0	0	0	0	0	0
100	5050	5050	0	0	0	0	0	0	0	0

THE RECORD

CLIPPER BELT LACER COMPANY. WORKED MORE HOURS WITHOUT A DISABLING INJURY THAN ANY OTHER SMALL UNIT WITH A PERFECT 1933 RECORD - 135,000.

According to the Metal Products Industries report of 1933 the Clipper Belt Lacer Company has worked more hours without a disability injury than any other unit with a perfect 1933 record. Clipper Hooks, of course, were used throughout the plant. This is just one indication of the safety of Clipper equipment.

Clipper Hooks are unsurpassed in quality and durability. Clipper Carded Hooks are safest to handle.

CLIPPER BELT LACER COMPANY, GRAND RAPIDS, MICHIGAN



## Clipper

Lacing Equipment



# JUST BETWEEN US TWO

## What Sins Are Committed . . .

**H**OLD a camera lens close enough to a blade of grass and you can make it look like the Washington monument. It's good clean fun and doesn't do anybody any harm.

But trick photography has no place where the mission of the illustration is to inform. If the photographer gets a kick out of it, let him hold his camera six inches from the nose of the lathe operator, whose nose is but six months from the cutting tool. But don't let him entitle the resulting photograph, "Machining in a Moscow macaroni mill." For the picture will do nothing to satisfy the appetite of those interested in Muscovite machining methods.

We plead for photographs that show a scene as the eye sees it. Let gross distortion, hectic high-lighting and exaltation of the unimportant be confined to photographs frankly designed to be "arty."

Our conception of a photograph entirely satisfying is the one in the Magnefer ad on the inside back cover of last week's IA.

## Too Modest, Believe It or Not

**A**MONG the statements modestly made in a paean we recently prepared was this: "IA carries more advertising than any other trade paper in its field."

A bolder soul asked, "Why the qualifying 'in its field'?" So we looked up the August space records for all trade papers in all fields, and find IA is at the top, with 42 per cent to spare. A nice lead, what?

## Morro Castles in Industry

**S**KIPPERS of other ships must be eagerly absorbing every line of testimony in the Morro Castle hearings, resulting in a tightening up of inspections and fire drills and improvement in ship management generally.

Which makes us think what a quaint thing it would be to cross-examine the "skipper" of a wrecked manufacturing business. The interrogating official might ask, for example, "What had you done in the past three years to improve your product? Is there any truth in the allegation that your auditing methods were so lax that you really did not know what your costs were?"

"Do you deny that you failed to provide necessary trade papers to members of your organization at the very time you were hounding them to get costs down? Did you fatuously believe that 'the company name' would continue to bring in business after you cut out advertising and sales promotion generally?"

"Did you pay out in profits money you should have set aside for depreciation?"

Public hearings, followed by punishment for proved flagrant carelessness, would do much by example to reduce the business mortality rate.

## Foresight

**J**OBS are scarce, as you may have heard. Job-hunters have to plan ahead. The champion planner-aheader we know of is a young man who writes us that he wants a job on the seadrome, the projected mid-ocean airport. This is our idea of the perfect excuse for loafing for quite awhile.

## Liberty Still Popular

**A** MACHINE TOOL builder writes:

"All IRON AGE editorials and especially the one in the Sept. 6 IA ('Old, But Worth Reading Again'), should be reprinted so that every voter in the United States would have a copy."

This was the editorial quoting from the Declaration of Independence. Newspapers all over the country reprinted it.

## Job for Engineers

**"M**ONEY, for the engineers I have known, if they would put their minds to it, is a much more simple matter than problems they meet every day."—Page 12, Sept. 20 IA. The trouble is that a man's ability to master the intricacies of money is so often in inverse ratio to his ability to acquire it. As Wall Street says, "Them that talks about money, ain't got some."—A.H.D.



**Cutting Off  
Machines for  
Sawing All Kinds  
of Metals**

**THE ESPEN-LUCAS MACHINE WORKS**  
FRONT AND GIRARD AVE. PHILADELPHIA, PENNA.

## Cutting-Off Machines

—for thin and thick wall steel tubing and bars

**BARDONS & OLIVER**

Cleveland, Ohio

We also manufacture a large line of turret machinery for finishing cast iron, steel and brass



## ARMSTRONG TOOL HOLDERS

Save All Forging, 70% Grinding and 90% High Speed Steel. Over 100 sizes and shapes—holders for every operation on lathes, planers, slotters and shapers.

**Armstrong Bros. Tool Co.**  
"The Tool Holder People"  
309 N. Francisco Ave.  
CHICAGO, U. S. A.

Write for  
Catalog

## THE CLEVELAND CO. STEEL TOOL CO.

Punches, Dies, Chisels, Rivet Sets  
660 E. 82<sup>nd</sup> St. Cleveland, O.

If it's **RIVETED** you **KNOW** it's safe

## Emery Wheel Dressers

Two Sizes

**CUTTERS**

Nos. 1-2

We make the regular Huntington (Pattern) for all sizes, Roughing for Nos. 1 and 2. Paragon for No. 1 only.

**GEO. H. CALDER CO., Lancaster, Pa., U.S.A.**

17 STYLES AND SIZES  
**MERRELL**  
PIPE THREADING for BETTER threads MACHINES  
TOLEDO, OHIO

## THOMAS

**SPACING MACHINE COMPANY**  
PITTSBURGH  
PUNCHING AND SHEARING MACHINERY

## HYDRAULIC MACHINERY

OF EVERY SIZE AND DESCRIPTION

**AUTOMATIC GAS PRODUCERS**

Ask for Catalogues

**R. D. WOOD & CO.**  
PHILADELPHIA, PA. : FOUNDED 1803

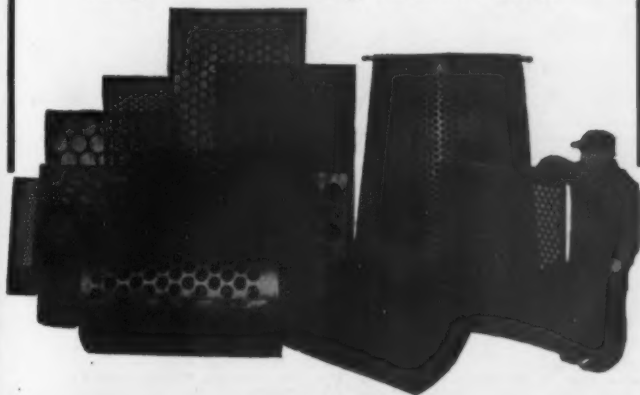
# SCREENS

## of Perforated Metal

### For a Thousand Uses

For Grain, Minerals, Chemicals or any other material to be screened  
Ornamental Designs for Grilles, Cabinets, etc.

Any Metal—Any Perforation



*The*  
**Harrington & King**  
PERFORATING CO.

5657 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

## Cone 4-Spindle Automatics

Are economical and accurate producers of screw machine parts up to 6" diameter, 7" milling length. They cut costs, increase production, boost profits.

Write for particulars

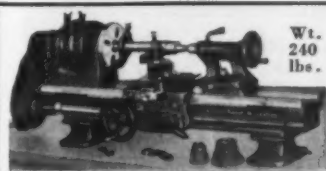
### CONE AUTOMATIC MACHINE CO., Inc.

WINDSOR, VERMONT

REPRESENTATIVES:

**Detroit:** J. C. Austerberry's Sons, 634 E. Congress St., Detroit, Mich.  
**Chicago:** John H. Glover, 2127 North Sayre Ave., Chicago, Ill.  
**Ohio:** S. E. Martin, 1877 Erie Cliff Drive, Lakewood, Ohio.  
**New England:** Potter & Johnson Machine Co., Pawtucket, R. I.  
**Indiana:** G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.

**New York State:** Syracuse Supply Co., Syracuse, N. Y.; also Rochester, N. Y.  
**Pennsylvania:** Arch Machinery Co., 1005 Park Bldg., Pittsburgh, Pa.  
**Philadelphia:** Lloyd & Arms, Inc., 133 South 38th St., Philadelphia, Pa.  
**California:** C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif.



9"x3' Back-Geared, Screw Cutting \$75  
"Workshop" Bench Lathe.....

Wt.  
240  
lbs.

### SOUTH BEND LATHES

96 other sizes and types of Back-Geared, Screw Cutting Lathes from 9" to 18" swing, \$75 to \$1500, on terms if desired, shown in new General Catalog No. 94. Write for copy.

**South Bend Lathe Works**  
324 E. Madison St.,  
South Bend, Indiana, U. S. A.

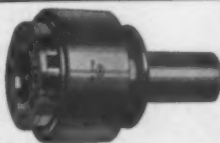
**H & G**  
DIE HEAD

CUT THREADS  
BETTER  
QUICKER  
CHEAPER

Sizes and Styles for All Machines  
**THE EASTERN MACHINE SCREW CORP.**  
21-41 Barclay St., New Haven, Conn.

Pacific Coast Representatives:

Los Angeles, A. C. Behringer, 812-816 Commercial St., Los Angeles, Cal.  
San Francisco, A. H. Coates Co., 1142 Howard St., San Francisco, Cal.



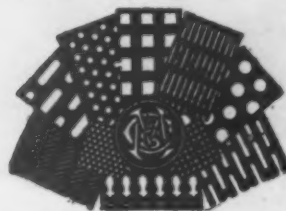
## MUNDT

### PERFORATED METALS

Large stocks of all metals always in hand ready to punch for any arrangement of perforations.

Sixty-one years of manufacturing perforated metals for every conceivable purpose assures satisfaction.

Write for Catalog of Patterns.



TIN, STEEL, COPPER, ALUMINUM, BRONZE,  
BRASS, ZINC, ANY METAL, ANY PURPOSE

**CHARLES MUNDT & SONS**

88 FAIRMOUNT AVE., JERSEY CITY, N. J.

## Those Two Old Standbys— Service and Workmanship.

Probably every manufacturer of an industrial product, at some time or other, has offered service and workmanship as reasons why he should be favored with the buyer's business. Yet, trite and threadbare as these overworked words sound, they are good reasons for influencing a purchase—as every experienced buyer knows. At the risk of being criticized for doing the hackneyed thing, let us emphasize the service and workmanship that characterize Hendrick Perforated Metal.

We have large stocks of metal . . . probably the largest range of dies in the industry . . . ample plant capacity . . . shipping facilities over three railroads . . . motor truck delivery . . . everything, including the will, required to render good service on all orders.

It isn't quite as easy to enumerate the points that distinguish Hendrick workmanship—but just examine a piece of Hendrick Perforated Plate. The workmanship will speak for itself.

### HENDRICK MFG. CO.

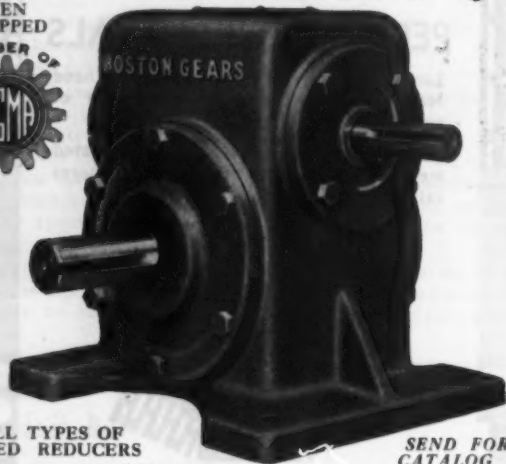
37 Dundaff Street Carbondale, Pa.

Baltimore Birmingham Boston  
Cincinnati Cleveland Detroit Hazelton  
New York Philadelphia Pittsburgh



# HIGHEST QUALITY! THROUGHOUT

TIMKEN  
EQUIPPED



ALL TYPES OF  
SPEED REDUCERS  
"from stock"

SEND FOR  
CATALOG

BOSTON GEAR WORKS, Inc., Dept. 1A, North Quincy, Mass.  
Boston New York  
Philadelphia Cleveland Chicago  
Sales Office in Springfield, Mass.  
SERVICE STATIONS FROM COAST TO COAST

## BOSTON GEARS

# EARLE

Cut Spur, Bevel, Herring-  
bone and Worm Gears  
All Sizes. Every Description Oper-  
ating Machinery for Bridges, etc.  
"Les Simpler" Cold Metal Saws.

The Earle Gear &  
Machine Co.  
4715 Stenton Ave.  
Philadelphia, Pa.

110 State St., Boston, Mass.  
95 Liberty St., New York City

# GEARS



## Mac-its Hold!

Will not "round out," split, strip their  
threads or mushroom.

THE STRONG, CARLISLE &  
HAMMOND CO., CLEVELAND, O.

# VICTOR

True Tolerance

## RIVETS

WELDING ROD  
TONCAN IRON  
STAINLESS STEEL

CHAIN PINS  
COUPLER  
AIR BRAKE PINS

EAST CHICAGO INDIANA

THE CHAMPION RIVET COMPANY  
CLEVELAND, OHIO

RIVETS MADE TO ORDER IN ANY METAL

JOHN HASSALL, INC. EST. 1850 CLAY & OAKLAND STS. BROOKLYN, N.Y.

## PRODUCTS

**ABRASIVE WHEELS**—See Grinding Wheels  
**ABRASIVE CLOTH & PAPER**  
Norton Co., Worcester, Mass.  
**ABRASIVE**—Steel Shot and Grit  
Pangborn Corp., Hagerstown, Md.  
**ACCUMULATORS**—Hydraulic  
Baldwin-Southwark Corp., Philadelphia.  
Lake Erie Engng. Corp., 68 Kenmore Sta.,  
Buffalo, N. Y.  
Wood, R. D. & Co., Philadelphia.  
**ACETYLENE**—Dissolved in Cylinders  
Air Reduction Sales Co., 60 East 42nd  
St., N. Y. C.  
Linde Air Prods. Co., The, 30 East 42nd  
St., N. Y. C.  
**ACID-PROOF LINING**  
Celcote Co., The, Cleveland.  
**ACIDS**—Pickling  
American Chemical Paint Co., Ambler, Pa.  
Grasselli Chemical Co., Inc., Cleveland.  
**AIR CONDITIONING EQUIPMENT**  
American Blower Corp., Detroit.  
**AIR TANKS AND CYLINDERS**  
Scaife, William B. & Sons Co., Pgh.  
**ALLOYS**—Calcium-Silicon  
Electro Metallurgical Sales Corp., 30 East  
42nd St., N. Y. C.  
**ALLOYS**—Heat Resisting  
Electro Alloys Co., Elyria, Ohio.  
**ALLOYS**—Magnesium  
Dow Chemical Co., Midland, Mich.  
**ALLOYS**—Phosphor Bronze  
Phosphor Bronze Smelting Co., Philadel-  
phia.  
**ALLOYS**—Silico-Manganese  
Electro Metallurgical Sales Corp., 30 East  
42nd St., N. Y. C.  
**ALLOYS**—Titanium  
Metal & Thermit Corp., 120 B'way,  
N. Y. C.  
Titanium Alloy Mfg. Co., Niagara Falls,  
N. Y.  
**ALLOYS**—Tungsten  
Vanadium Corp. of America, 120 Broadway,  
N. Y. C.  
**ALLOYS**—Vanadium  
Vanadium Corp. of America, 120 Broadway,  
N. Y. C.  
**ALLOYS**—Zinc Base Die Casting  
New Jersey Zinc Co., The, 160 Front  
St., N. Y. C.  
**ALUMINUM**  
Aluminum Co. of America, Pittsburgh.  
British Aluminum Co., Ltd., 30 Rocke-  
feller Plaza, R. C. A. Bldg., N. Y. C.  
**AMMETERS AND VOLTMETERS**—Re-  
cording  
Bristol Co., Waterbury, Conn.  
**AMMONIA RECOVERY PLANTS**  
Koppers Construction Co., The, Pittsburgh.  
**ANGLES, BEAMS, CHANNELS AND  
TEES**  
Carnegie Steel Co., Pittsburgh.  
Illinois Steel Co., Chicago.  
Inland Steel Co., Chicago.  
Jones & Laughlin Steel Corp., Pittsburgh.  
Pacific Coast Steel Corp., San Francisco,  
Calif.  
Ryerson, Jos. T. & Son, Inc., Chicago.  
Steel & Tubes, Inc., Cleveland.  
Weirton (W. Va.) Steel Co.  
**ANGLES, BEAMS, CHANNELS & TEES**  
—Magnesium Alloys  
Dow Chemical Co., Midland, Mich.  
**ANNEALING**—See Heat Treating  
**ANNEALING BOXES**  
Wilson, Lee Engineering Co., Cleveland.  
**ANNEALING COVERS**  
Surface Combustion Corporation, 2375  
Dorr St., Toledo  
Wilson, Lee Engineering Co., Cleveland.  
**ANODES**—All Types  
Grasselli Chemical Co., Inc., Cleveland.  
Idylite Co., The, Detroit.  
**ANODES**—Cadmium  
Grasselli Chemical Co., Inc., Cleveland.  
Idylite Co., The, Detroit.  
**ARBORS**  
Morse Twist Drill & Mch. Co., New Bed-  
ford, Mass.  
**ARRESTERS**—Spark  
Harrington & King Perforating Co., Chl.  
**AUCTIONEERS**  
Freeman, Samuel T. & Co., Philadelphia.  
Industrial Plants Corp. of Ohio, 12801  
Jefferson Ave., Detroit, Mich.

**AXLES**—Car or Locomotive  
Carnegie Steel Co., Pittsburgh.  
Illinois Steel Co., Chicago.  
**BALLS**—Burnishing  
Abbott Ball Co., The, 1047 New Britain  
Ave., Hartford, Conn.  
**BALLS**—Steel, Brass or Bronze  
Abbott Ball Co., The, 1047 New Britain  
Ave., Hartford, Conn.  
New Departure Mfg. Co., Bristol, Conn.  
SKF Industries, Inc., Front St. & Erie  
Ave., Phila., Pa.  
**BANDS**—Steel  
Bethlehem (Pa.) Steel Company.  
Inland Steel Co., Chicago.  
**BANDS**—Welded  
Amer. Welding & Mfg. Co., Warren, O.  
**BARRELS**—Burnishing  
Abbott Ball Co., The, 1047 New Britain  
Ave., Hartford, Conn.  
Globe Mch. & Stpg. Co., Cleveland.  
**BARRELS**—Tumbling  
Abbott Ball Co., The, 1047 New Britain  
Ave., Hartford, Conn.  
Baird Mch. Co., Bridgeport, Conn.  
Globe Mch. & Stpg. Co., Cleveland.  
**BARS**—Alloy  
Allegheny Steel Co., Brackenridge, Pa.  
Republic Steel Corp., Youngstown, Ohio.  
**BARS**—Aluminum  
Aluminum Co. of America, Pittsburgh.  
**BARS**—Brass—Bronze or Copper  
Johnson Bronze Co., New Castle, Pa.  
**BARS**—Cold Drawn  
Union Drawn Steel Co., Massillon, Ohio.  
**BARS**—Concrete, Reinforcing  
Inland Steel Co., Chicago.  
Jones & Laughlin Steel Corp., Pittsburgh.  
Laclede Steel Co., St. Louis, Mo.  
Pacific Coast Steel Corp., San Francisco,  
Calif.  
**BARS**—Magnesium Alloys  
Dow Chemical Co., Midland, Mich.  
**BARS**—Steel  
Ames, W. & Co., Jersey City, N. J.  
Andrews Steel Co., The, Newport, Ky.  
Bethlehem (Pa.) Steel Company.  
Carnegie Steel Co., Pittsburgh.  
Illinois Steel Co., Chicago.  
Inland Steel Co., Chicago.  
Jones & Laughlin Steel Corp., Pittsburgh.  
Republic Steel Corp., Youngstown, Ohio.  
Ryerson, Joseph T. & Son, Inc., Chicago.  
Steel & Tubes, Inc., Cleveland.  
Timken Roller Bearing Co., Canton, Ohio.  
Timken Steel & Tube Co., The, Canton, O.  
Weirton (W. Va.) Steel Co.  
Youngstown (Ohio) Sheet & Tube Co.  
**BASES**—Column, Machinery  
Lukens Steel Co., Coatesville, Pa.  
**BATTERIES**—Storage  
Electric Storage Battery Co., Phila.  
**BATTERY CHARGERS**  
Ctler-Hammer, Inc., Milwaukee.  
**BEAMS**—See Angles, Beams, Channels  
and Tees  
**BEARINGS**—Babbitt  
Bunting Brass & Bronze Co., Toledo, O.  
Cramp Brass & Iron Foundries Co., Phila.  
Johnson Bronze Co., New Castle, Pa.  
**BEARINGS**—Ball  
Bantam Ball Bearing Co., South Bend, Ind.  
Federal Bearings Co., Inc., Poughkeepsie,  
N. Y.  
New Departure Mfg. Co., Bristol, Conn.  
Norma-Hoffmann Bearings Corp., Stam-  
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SKF Industries, Inc., Front St. & Erie  
Ave., Phila., Pa.  
Schatz Mfg. Co., The, Poughkeepsie, N. Y.  
**BEARINGS**—Brass and Bronze  
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Cramp Brass & Iron Foundries Co., Phila.  
Johnson Bronze Co., New Castle, Pa.  
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Island City, N. Y.  
**BEARINGS**—Quill Roller  
Bantam Ball Bearing Co., South Bend, Ind.  
**BEARINGS**—Radial  
Bantam Ball Bearing Co., South Bend, Ind.  
Norma-Hoffmann Bearings Corp., Stam-  
ford, Conn.  
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Federal Bearings Co., Inc., Poughkeepsie, N. Y.

Norma-Hoffmann Bearings Corp., Stamford, Conn.  
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.  
Timken Roller Bearing Co., Canton, O.

**BEARINGS—Roller Tapered**  
Bantam Ball Bearing Co., South Bend, Ind.

Timken Roller Bearing Co., Canton, O.

**BEARINGS—Shaft Hanger**  
Norma-Hoffmann Bearings Corp., Stamford, Conn.

S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

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Bantam Ball Bearing Co., South Bend, Ind.

Norma-Hoffmann Bearings Corp., Stamford, Conn.

S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Timken Roller Bearing Co., Canton, O.

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Bristol Co., Waterbury, Conn.

Clipper Belt Lacer Co., Grand Rapids, Mich.

**BELT LACER**  
Bristol Co., Waterbury, Conn.

Clipper Belt Lacer Co., Grand Rapids, Mich.

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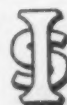
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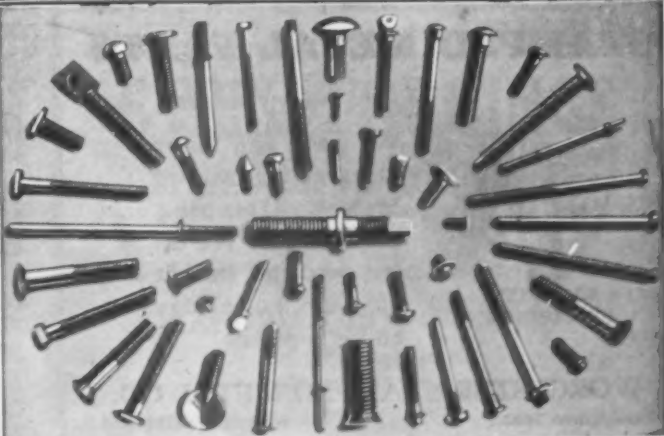
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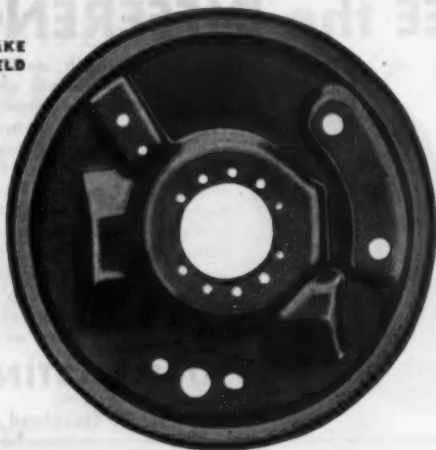
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Albert Pipe Supply Co., Inc., Berry &  
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Morse Twist Drill & Mch. Co., New Bed-  
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 Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.  
 Morgan Engineering Co., Alliance, O.  
 Osborn Mfg. Co., Cleveland.  
 Payne, N. B. & Co., 105 West 55th St., N. Y. C.  
 Robbins & Myers, Inc., Springfield, Ohio.  
 Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.  
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 Shenango-Penn. Mold Co., Pittsburgh.  
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 British Aluminum Co., Ltd., 30 Rockefeller Plaza, R. C. A. Bldg., N. Y. C.  
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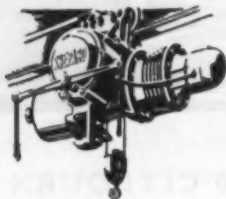
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**Bullard Co., The, Bridgeport, Conn.**

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**DeWitt Tool Co., 254 Lafayette St., N. Y. C.**

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**Eastern Mchry. Co., 3263 Spring Grove Ave., Cincinnati, O.**

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**NUTS**—Cast  
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**NUTS**—Cast  
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

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Republic Steel Corp., Upon Nut Div., Cleveland, O.

**NUTS**—Cold Punched  
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

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**OILS**—Lubricating  
Socoy-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.

**OILS**—Lubricating  
Tide Water Oil Co., 17 Battery Place, N. Y. C.

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**ORES**—Iron  
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**ORES**—Iron  
Picklands Mather & Co., Cleveland, Ohio.

**ORES**—Iron  
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**ORES**—Iron  
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Koppers Construction Co., The, Pittsburgh.

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**OVENS**—Cross Regenerative  
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**PIG IRON**  
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**Jones & Laughlin Steel Corp., Pittsburgh.**  
**Lukens Steel Co., Coatesville, Pa.**  
**Pacific Coast Steel Corp., San Francisco, Calif.**  
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### SHEETS—Cold Rolled

American Rolling Mill Co., Middletown, O.

American Sheet & Tin Plate Co., Pitts-

burgh.

Inland Steel Co., Chicago.

Republic Steel Corp., Youngstown, O.

Ryerson, Jos. T. & Son, Inc., Chicago.

Weirton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co.

### SHEETS—Copper Steel

Inland Steel Co., Chicago.

Newport (Ky.) Rolling Mill Co.

Republic Steel Corp., Youngstown, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago.

Weirton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co.

### SHEETS—Enameling Steel (Genuine Open-Hearth Iron)

American Rolling Mill Co., Middletown, O.

Inland Steel Co., Chicago.

Newport (Ky.) Rolling Mill Co.

Republic Steel Corp., Youngstown, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago.

Weirton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co.

Youngstown (Ohio) Sheet & Tube Co.

### SHOES—Horse and Mule

Burden Iron Co., The Troy, N. Y.

### SLABS

Andrews Steel Co., The Newport, Ky.

Central Iron & Steel Co., Harrisburg, Pa.

### SLINGS—Wire Rope

Roebbing's, John A. Sons Co., Tremont,

N. J.

### SLOTTING MACHINES

Nazel Engng. & Mch. Wks., Philadelphia.

### SPACING TABLES—Punching & Shearing

Thomas Spacing Mach. Co., Pittsburgh.

### SPECIAL MACHINERY

Baldwin-Southwark Corp., Southwark Div.,

Philadelphia.

Bullard Co., The Bridgeport.

Conran, Frederick M., 107 Colden St.,

Newark, N. J.

Eastern Tool & Mfg. Co., Bloomfield, N. J.

Knott, E. B., Mch. Co., Sharon, Mass.

Morgan Engineering Co., Alliance, Ohio.

Quickwork Co., The St. Marys, Ohio.

Torrington (Conn.) Mfg. Co.

Treadwell Engineering Co., Easton, Pa.

Wood, R. D. & Co., Philadelphia Pa.

### SPECIALTIES—Rubber Covered & Lined

American Hard Rubber Co., 11 Mercer St.,

N. Y. C.

### SPEED REDUCERS

Boston Gear Wks., Inc., North Quincy,

Mass.

Link-Belt Co., Chicago.

Morse Chain Co., Ithaca, N. Y.

Philadelphia (Pa.) Gear Works.

### SPIKES—Track

Ames, W. & Co., Jersey City, N. J.

Illinois Steel Co., Chicago.

Inland Steel Co., Chicago.

### SPLICE BARS

Illinois Steel Co., Chicago.

Inland Steel Co., Chicago.

### SPRING MAKING MACHINERY

Baird Machine Co., Bridgeport, Conn.

### SPRINGS—Car

American Steel & Wire Co., Chicago.

Miller & Van Winkle, Inc., 18 Bridge St.,

Brooklyn, N. Y.

SPRINGS—Extension, Compression, Yer-

son or Flat

Amer. Spring & Mfg. Corp., Holly, Mich.

American Steel & Wire Co., Chicago.

Barnes-Gibson-Raymond, Inc., Detroit.

Barnes, Wallace, Co., The, Bristol Conn.

Cook Spring Co., Div. of Barnes-Gibson-

Raymond, Inc., Ann Arbor, Mich.

Cuyahoga Spring Co., Cleveland.

Dunbar Bros. Co., Bristol, Conn.

Gibson, Wm. D. Co., Chicago.

Hubbard, M. D., Spring Co., Pontiac,

Mich.

Lee Spring Co., Inc., 30 Main St., Brook-

lyn, N. Y.

Miller & Van Winkle, Inc., 18 Bridge St.,

Brooklyn, N. Y.

Raymond Mfg. Co., Corry, Pa.

U. S. Steel Wire Spring Co., Cleveland, O.

Wickwire Spencer Steel Co., 41 East 42nd

St., N. Y. C.

### SPRINGS—Flat

Amer. Spring & Mfg. Corp., Holly, Mich.

American Steel & Wire Co., Chicago.

Barnes-Gibson-Raymond, Inc., Detroit.

Barnes, Wallace, Co., The, Bristol Conn.

Champion Sheet Metal Co., Inc., Carlisle,

N. Y.

Cook Spring Co., Div. of Barnes-Gibson-

Raymond, Inc., Ann Arbor, Mich.

Crosby Co., The, Buffalo, N. Y.

Dickey-Grabler Co., Cleveland.

Dunbar Bros. Co., Bristol, Conn.

Eastern Tool & Stpg. Co., Inc., Saugus,

Mass.

General Mach. & Mfg. Co., Bridgeport, Ct.

Gibson, Wm. D. Co., Chicago.

Globe Mch. & Stpg. Co., Cleveland.

Hubbard, M. D., Spring Co., Pontiac,

Mich.

Lansing (Mich.) Stamping Co., So. Penn

Ave.

Lee Spring Co., Inc., 30 Main St., Brook-

lyn, N. Y.

Miller & Van Winkle, Inc., 18 Bridge St.,

Brooklyn, N. Y.

Parish Pressed Steel Co., Reading, Pa.

Raymond Mfg. Co., Corry, Pa.

Smith, Thomas, Co., 285 Grove St., West-

chester, Mass.

Torrington (Ct.) Co.

Veeder-Root, Inc., Hartford, Ct.

Worcester (Mass.) Stamped Metal Co.

SPRINGS—Steel Alloys and Figures

Dickey-Grabler Co., Cleveland.

Noble & Westbrook Mfg. Co., East Hart-

ford, Ct.

SPRINGS—Wire

Titchener, E. H. & Co., Binghamton,

N. Y.

Wickwire Brothers, Cortland, N. Y.

STEEL—Acid Resisting

Duriron Co., Inc., The, 438 N. Findlay

St., Dayton, Ohio.

STEEL—Alloy

Alan Wood Steel Co., Conshohocken, Pa.

American Steel & Wire Co., Chicago.

Andrews Steel Co., The, Newport, Ky.

Bethlehem (Pa.) Steel Company.

Blisset Steel Co., The, Cleveland.

Carpenter Steel Co., 131 W. Bern St.,

Reading, Pa.

Detroit (Mich.) Alloy Steel Co.

Harrisburg (Pa.) Pipe & Pipe Bending Co.

Ingersoll Steel & Disc Co., Chicago.

Latrobe (Pa.) Electric Steel Co.

Ludlum Steel Co., Watervliet, N. Y.

Pacific Coast Steel Corp., San Francisco,

Calif.

Republic Steel Corp., Youngstown, Ohio.

Ryerson, Jos. T. & Son, Inc., Chicago.

Timken Roller Bearing Co., Canton, Ohio.

Timken Steel & Tube Co., The, Canton, O.

Vanadium-Alloys Steel Co., Latrobe, Pa.

Wheelock, Lorejoy & Co., Inc., Cambridge,

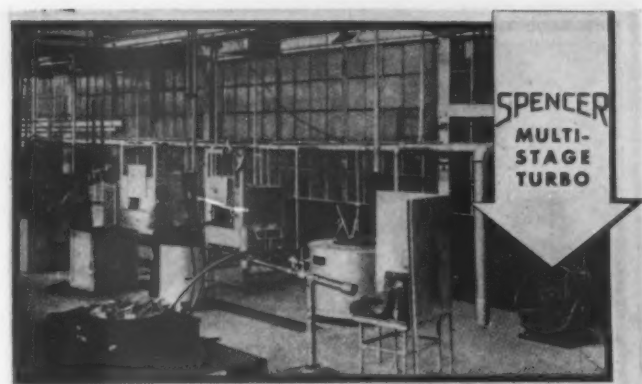
Mass.

STEEL—Alloy, Cold Drawn

Rites & Laughlin, Inc., Harvey, Ill.

Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.  
 Wyckoff Drawn Steel Co., Pittsburgh, Pa.  
**STEEL—Bright Finished**  
 Union Drawn Steel Co., Massillon, Ohio.  
**STEEL—Carbon**  
 Andrews Steel Co., The Newport, Ky.  
 Carnegie Steel Co., Pittsburgh.  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Harrisburg (Pa.) Pipe & Pipe Bending Co.  
 Ingersoll Steel & Disc Co., Chicago.  
 Latrobe (Pa.) Electric Steel Co.  
**STEEL—Carbon Vanadium**  
 Andrews Steel Co., The Newport, Ky.  
 Latrobe (Pa.) Electric Steel Co.  
**STEEL—Chrome**  
 American Steel & Wire Co., Chicago.  
 Andrews Steel Co., The Newport, Ky.  
 Latrobe (Pa.) Electric Steel Co.  
**STEEL—Chrome Manganese**  
 Latrobe (Pa.) Electric Steel Co.  
**STEEL—Chrome Nickel**  
 American Steel & Wire Co., Chicago.  
 Andrews Steel Co., The Newport, Ky.  
 Harrisburg (Pa.) Pipe & Pipe Bending Co.  
 Latrobe (Pa.) Electric Steel Co.  
**STEEL—Chrome Nickel Silver**  
 Ingersoll Steel & Disc Co., Chicago.  
**STEEL—Chrome Nickel Stainless**  
 Allegheny Steel Co., Brackenridge, Pa.  
**STEEL—Chrome Stainless**  
 Allegheny Steel Co., Brackenridge, Pa.  
**STEEL—Chrome Vanadium**  
 Andrews Steel Co., The Newport, Ky.  
 Harrisburg (Pa.) Pipe & Pipe Bending Co.  
 Latrobe (Pa.) Electric Steel Co.  
**STEEL—Cold Drawn**  
 American Steel & Wire Co., Chicago.  
 Bliss & Laughlin, Inc., Harvey, Ill.  
 Jones & Laughlin Steel Corp., Pittsburgh.  
 Latrobe (Pa.) Electric Steel Co.  
 Rathbun, A. B. & J., Palmer, Mass.  
 Ryerson, Joseph T. & Son, Inc., Chicago.  
 Union Drawn Steel Co., Massillon, Ohio.  
 Wyckoff Drawn Steel Co., Pittsburgh, Pa.  
**STEEL—Cold Rolled Strips**  
 Acme Steel Co., Chicago.  
 American Steel & Wire Co., Chicago.  
 Athens Steel Co., 135 William St., N. Y.  
 Griffin Mfg. Co., Erie, Pa.  
 Inland Steel Co., Chicago.  
 Latrobe (Pa.) Electric Steel Co.  
 Republic Steel Corp., Youngstown, Ohio.  
 Ryerson, Jos. T. & Son, Inc., Chicago.  
 Stanley Works, The New Britain, Conn.  
 Steel & Tubes, Inc., Cleveland.  
 Superior Steel Corp., Grant Bldg., Pgh.  
 Thomas Steel Co., Warren, Ohio.  
 Weirton (W. Va.) Steel Co.  
 West Leeburg Steel Co., Pittsburgh.  
 Wetherill Bros. Bridge, 39, Mass.  
**STEEL—Cold Rolled Strips, Chrome Nickel**  
 Acme Steel Co., Chicago.  
 Griffin Mfg. Co., Erie, Pa.  
**STEEL—Cold Rolled Strips, Electric Cap-**  
**per Coated**  
 Thomas Steel Co., Warren, Ohio.  
**STEEL—Cold Rolled Strips, Electro-**  
**Galvanized**  
 Thomas Steel Co., Warren, Ohio.  
**STEEL—Cold Rolled Strips, Electro Tin**  
**Coated**  
 Thomas Steel Co., Warren, Ohio.  
**STEEL—Corrosion Resisting**  
 American Steel & Wire Co., Chicago.  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Midvale Co., The Nicetown, Phila., Pa.  
**STEEL—Crucible**  
 Jessop, Wm. & Sons, Inc., 121 Varick St., N. Y. C.  
 Vanadium-Alloys Steel Co., Latrobe, Pa.  
**STEEL—Cutlery**  
 Jessop, Wm. & Sons, Inc., 121 Varick St., N. Y. C.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
**STEEL—Die**  
 Andrews Steel Co., The Newport, Ky.  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Diston, Henry & Sons, Inc., Philadelphia.  
 Jessop, Wm. & Sons, Inc., 121 Varick St., N. Y. C.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
**STEEL—Drum**  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
 Pacific Coast Steel Corp., San Francisco, Calif.  
**STEEL—Electric**  
 Diston, Henry & Sons, Inc., Philadelphia.  
 Inland Steel Co., Chicago.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
 Timken Roller Bearing Co., Canton, Ohio.  
 Timken Steel & Tube Co., The Canton, O.  
 Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.  
**STEEL—High Speed**  
 Bethlehem (Pa.) Steel Company  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Ingersoll Steel & Disc Co., Chicago.  
 Jessop, Wm. & Sons, Inc., 121 Varick St., N. Y. C.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
 Vanadium-Alloys Steel Co., Latrobe, Pa.  
**STEEL—Hot Rolled Strips**  
 Illinois Steel Co., Chicago.  
 Inland Steel Co., Chicago.  
 Laclede Steel Co., St. Louis, Mo.  
 Latrobe (Pa.) Electric Steel Co.  
 Republic Steel Corp., Youngstown, Ohio.  
 Ryerson, Jos. T. & Son, Inc., Chicago.  
 Stanley Works, The New Britain, Ct.  
 Steel & Tubes, Inc., Cleveland.  
 Superior Steel Corp., Grant Bldg., Pgh.  
 Weirton (W. Va.) Steel Co.  
 West Leeburg Steel Co., Pittsburgh.  
**STEEL—Hot Rolled Strips, Electro Zinc**  
**Coated**  
 Thomas Steel Co., Warren, O.  
**STEEL—Importers**  
 Jessop, Wm. & Sons, Inc., 121 Varick St., N. Y. C.  
**STEEL—Magnesit**  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Latrobe (Pa.) Electric Steel Co.

**STEEL—Nickel**  
 Andrews Steel Co., The Newport, Ky.  
**STEEL—Open Hearth**  
 Andrews Steel Co., The Newport, Ky.  
 Pittsburgh (Pa.) Steel Co.  
 Timken Roller Bearing Co., Canton, Ohio.  
 Timken Steel & Tube Co., The Canton, O.  
**STEEL—Rustless**  
 Allegheny Steel Co., Brackenridge, Pa.  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Griffin Mfg. Co., Erie, Pa.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
**STEEL—Screw**  
 Bliss & Laughlin, Inc., Harvey, Ill.  
 Timken Roller Bearing Co., Canton, Ohio.  
 Timken Steel & Tube Co., The Canton, O.  
 Union Drawn Steel Co., Massillon, Ohio.  
 Wyckoff Drawn Steel Co., Pittsburgh, Pa.  
**STEEL—Special Analysis**  
 Andrews Steel Co., The Newport, Ky.  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Harrisburg (Pa.) Pipe & Pipe Bending Co.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
 Republic Steel Corp., Youngstown, Ohio.  
 Timken Roller Bearing Co., Canton, Ohio.  
 Timken Steel & Tube Co., The Canton, O.  
 West Leeburg Steel Co., Pittsburgh, Pa.  
**STEEL—Spring**  
 Athens Steel Co., 135 William St., N. Y.  
 Barnes-Gibson-Raymond, Inc., Detroit.  
 Barnes, Wallace, Co., The Bristol, Conn.  
 Gibson, Wm. D., Co., Chicago.  
 Republic Steel Corp., Youngstown, Ohio.  
 Timken Roller Bearing Co., Canton, Ohio.  
 Timken Steel & Tube Co., The Canton, O.  
**STEEL—Stainless**  
 Allegheny Steel Co., Brackenridge, Pa.  
 American Steel & Wire Co., Chicago.  
 Bethlehem (Pa.) Steel Company.  
 Carnegie Steel Co., Pittsburgh.  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Diston, Henry & Sons, Inc., Philadelphia.  
 Illinois Steel Co., Chicago.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
 Midvale Co., The Nicetown, Phila., Pa.  
 Republic Steel Corp., Youngstown, Ohio.  
 Ryerson, Jos. T. & Son, Inc., Chicago.  
 Union Drawn Steel Co., Massillon, Ohio.  
 Wetherill Bros. Co., Cambridge, 39, Mass.  
**STEEL—Stainless Cold**  
 Ingersoll Steel & Disc Co., Chicago.  
**STEEL—Tool**  
 Bethlehem (Pa.) Steel Company  
 Blissett Steel Co., The Cleveland.  
 Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
 Diston, Henry & Sons, Inc., Philadelphia.  
 Detroit (Mich.) Alloy Steel Co.  
 Ingersoll Steel & Disc Co., Chicago.  
 Jessop, Wm. & Sons, Inc., 121 Varick St., N. Y. C.  
 Latrobe (Pa.) Electric Steel Co.  
 Ludlum Steel Co., Watervliet, N. Y.  
 Midvale Co., The Nicetown, Phila., Pa.  
 Ryerson, Jos. T. & Son, Inc., Chicago.  
 Vanadium-Alloys Steel Co., Latrobe, Pa.  
 Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.  
**STEEL—Tool—Cast**  
 Detroit (Mich.) Alloy Steel Co.  
**STEEL—Tool, Special Shapes**  
 Latrobe (Pa.) Electric Co.  
**STEEL—Vanadium**  
 Andrews Steel Co., The Newport, Ky.  
 Latrobe (Pa.) Electric Steel Co.  
**STEEL PLANTS AND ROLLING MILLS**  
 Perin Engineering Co., Inc., 535 Fifth Ave., N. Y. C.  
**STENCILS—Brass**  
 Dickey-Grabler Co., Cleveland  
**STEPS—Ladder, Stairs, Safety**  
 Blaw-Knox Co., Pittsburgh.  
 Central Iron & Steel Co., Harrisburg, Pa.  
**STOCKS AND DIES**  
 Jones & Lamson Mch. Co., Springfield, Vt.  
**STOKES**  
 Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.  
**STOPS—Crane Limit**  
 Electric Controller & Mfg. Co., Cleveland.  
**STRAIGHTENING MACHINES—Bar & Tube**  
 Conran, Frederick M., 107 Colden St., Newark, N. J.  
 Medart Co., The, St. Louis, Mo.  
**STRUCTURAL IRON AND STEEL WORK**  
 American Bridge Co., Pittsburgh.  
 Morgan Engineering Co., Alliance, Ohio.  
**STRUCTURAL STEEL—See Angles, Beams, Channels and Tees**  
**SUPERHEATERS**  
 Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.  
**SWAGING MACHINES**  
 Quickwork Co., The, St. Marys, Ohio.  
 Torrington (Ct.) Co.  
**SWITCHES—Electric**  
 Westinghouse Elec. & Mfg. Co., East Pgh.  
**TACHOMETERS—Angular and Linear Velocity**  
 Babcock & Wilcox Co., Cambridge, Mass.  
**TAGS—Metal**  
 Dickey-Grabler Co., Cleveland.  
**TANK LINING**  
 Cellulose Co., The, Cleveland.  
**TANK LININGS—Rubber**  
 American Hard Rubber Co., 11 Mercer St., N. Y. C.  
 Goodrich, B. F. Co., Akron, Ohio.  
**TANKS—Compressed Air, Gas, Oil and Water**  
 Sealfon, Wm. B., & Sons Co., Pgh.  
 Westinghouse Traction Brake Co., Industrial Div., Wilmerding.  
**TANKS—Elevated Wood**  
 Hauser-Stander Tank Co., Cincinnati, Ohio.  
**TANKS—Iron and Steel**  
 Sealfon, Wm. B., & Sons Co., Pgh.  
**TANKS—Lead Lined**  
 Hauser-Stander Tank Co., Cincinnati, Ohio.  
**TANKS—Pikling**  
 American Hard Rubber Co., 11 Mercer St., N. Y. C.  
 Blaw-Knox Co., Pittsburgh.  
 Hauser-Stander Tank Co., Cincinnati, Ohio.  
 Nukem Products Corp., 68 Niagara St., Buffalo.



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Hauer-Stander Tank Co., Cincinnati, O.  
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Hauer-Stander Tank Co., Cincinnati, O.  
**TANKS—Welded**  
Blaw-Knox Co., Pittsburgh.  
National Tube Co., Pittsburgh.  
Scales Wm. B. & Sons Co., Pittsburgh.  
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Hauer-Stander Tank Co., Cincinnati, O.  
**TAPPING MACHINES**  
National Automatic Tool Co., Richmond, Ind.  
**TAPPING MACHINES—Nuts**  
National Mchry. Co., Tiffin, Ohio.  
**TAPS—Collapsing**  
Landis Mach. Co., Inc., Waynesboro, Pa.  
Murphy Machine & Tool Co., Detroit.  
**TAPS AND DIES**  
Landis Mch. Co., Inc., Waynesboro, Pa.  
Morse Twist Drill & Mch. Co., New Bedford, Mass.  
**TEES—See Angles, Beams, Channels and Tees**  
**TELEPHONES—Interior**  
Screw Machine Products Corp., Prov., R. I.  
**TERNE PLATES**  
American Sheet & Tin Plate Co., Pgh.  
**TERNE PLATES—Copper Bearing**  
Weirton (W. Va.) Steel Co.  
**TESTING MACHINES—Materials**  
Baldwin-Southwick Corp., Philadelphia.  
**THERMOMETERS—Recording**  
Bristol Co., Waterbury, Conn.  
**THREAD CUTTING TOOLS—See Dies and Taps**  
**THREAD ROLLING MACHINES**  
Nilson, A. H., Mach. Co., Bridgeport, Ct.  
**THREADING MACHINES**  
Landis Mch. Co., Waynesboro, Pa.  
National Mchry. Co., Tiffin, Ohio.  
**THREADING MACHINES—Automatic**  
Landis Mch. Co., Inc., Waynesboro, Pa.  
**THREADING MACHINES—Belt**  
Murphy Machine & Tool Co., Detroit.  
**TIE PLATES**  
Illinois Steel Co., Chicago.  
Inland Steel Co., Chicago.  
Weirton (W. Va.) Steel Co.  
**TIES—BALE**  
American Sheet & Wire Co., Chicago.  
American Sheet & Tin Plate Co., Pgh.  
**TIN PLATE**  
Granite City (Ill.) Steel Co.  
Jones & Laughlin Steel Corp., Pittsburgh.  
Pacific Coast Steel Corp., San Francisco, Calif.  
Republic Steel Corp., Youngstown, O.  
Weirton (W. Va.) Steel Co.  
Youngstown (Ohio) Sheet & Tube Co.  
**TIN PLATE MACHINERY**  
Wean Engineering Co., Inc., The Warren, Ohio.  
**TINNING EQUIPMENT—Sheets**  
Wean Engineering Co., Inc., The Warren, Ohio.  
**TIRE SETTING MACHINES**  
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.  
**TOOL BITS**  
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.  
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.  
Haynes Stellite Co., 30 East 42nd St., N. Y. C.  
**TOOL HOLDERS**  
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Armstrong Bros. Tool Co., Chicago.  
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.  
**TOOLS—Metal Cutting**  
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.  
Haynes Stellite Co., 30 East 42nd St., N. Y. C.  
**TOOLS—Tungsten Carbide**  
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.  
**TOOLS—Welded Tip**  
Haynes Stellite Co., 30 East 42nd St., N. Y. C.  
**TORCHES—Brazing, Cutting and Welding**  
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.  
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.  
**TRACTORS AND TRAILERS—See Trucks, Tractors and Trailers—Industrial**  
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**TRAMRAILS—Overhead Systems**  
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Osborn Mfg. Co., Cleveland.  
**TRAMWAYS—Wire Rope**  
American Steel & Wire Co., Chicago.  
Leschen, A., & Sons Rope Co., St. Louis, Mo.  
**TRANSMISSIONS—Hydraulic**  
Oilgear Co., The, 1811 W. Bruce St., Milwaukee.  
**TRUCKS—Elevating (Power)**  
Elwell-Parker Electric Co., The, Cleveland.  
Yale & Towne Mfg. Co., Stamford, Conn.  
**TRUCKS—Lift (Hand & Foot)**  
Yale & Towne Mfg. Co., Stamford, Conn.  
**TRUCKS, TRACTORS AND TRAILERS—Industrial**  
Atlas Car & Mfg. Co., Cleveland.  
Elwell-Parker Electric Co., The, Cleveland.  
Yale & Towne Mfg. Co., Stamford, Conn.  
**TUBE MILL MACHINERY**  
Torrington (Conn.) Mfg. Co.  
Treadwell Engineering Co., Easton, Pa.  
Tube Reducing Corp., 292 Madison Ave., N. Y. C.  
**TUBE REDUCING MACHINES**  
Tube Reducing Corp., 292 Madison Ave., N. Y. C.  
**TUBES—Boiler**  
Allegheny Steel Co., Brackenridge, Pa.  
National Tube Co., Pittsburgh.  
Pittsburgh (Pa.) Steel Co.  
**TUBES—High Carbon**  
Steel & Tubes, Inc., Cleveland.  
**TUBES—Nickel Silver**  
Riverside (N. J.) Mfg. Co.  
**TUBES—Stainless Steel**  
Allegheny Steel Co., Brackenridge, Pa.  
National Tube Co., Pittsburgh.  
**TUBING—Aluminum Seamless**  
Aluminum Co. of America, Pittsburgh.  
**TUBING—Flexible Metallic**  
Bisette Steel Co., The, Cleveland.  
**TUBING—Hard Rubber**  
American Hard Rubber Co., 11 Mercer St., N. Y. C.  
**TUBING—Magnesium Alloys**  
Dow Chemical Co., Midland, Mich.  
**TUBING—Nichrome**  
Steel & Tubes, Inc., Cleveland.  
**TUBING—Open Seam**  
Steel & Tubes, Inc., Cleveland.  
**TUBING—Phosphor Bronze**  
Phosphor Bronze Smelting Co., Philadelphia.  
Riverside (N. J.) Metal Co.  
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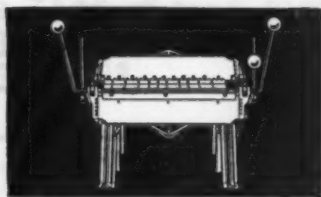
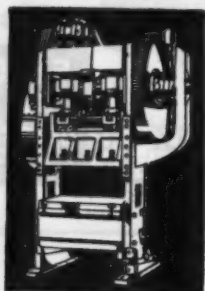
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BROWN & SHARPE—00, 00G, 0, No. 2 auto.  
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CLEVELAND—7/8, 1 1/4", 2" and 6 1/4" single  
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Gentleman with high connections by most important metallurgical Companies of Italy, who disposes of great warranties and good knowledge of the four modern languages, desires to represent in Italy first class houses. Write, Luigi ENRICO, Piazza Oche 1/2, Genoa, Italy.

*The Business Opportunities presented this week do not begin to indicate the full scope of this section . . .*

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To sell or lease business property or a business.

To sell patents on new products.

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SIMILAR SERVICES.**

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*Established 1915*  
**THE NATIONAL BUSINESS BOURSE**  
H. H. Harrison, Director  
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A manufacturer of Welded Steel House Heating Boilers, Hot Water Storage Heaters, Standard Vertical Boilers, Miniature Boilers and Miscellaneous Steel Plate Work desires **SALES REPRESENTATIVE** in Principal Cities of the Country. Address Box K-580, care *The Iron Age*, 239 W. 39th St., New York.

**METALLURGICAL ENGINEER** with some experience in the production of tool steel. Reply should give full details as to personal history, education, experience, and salary requirements. Address Box A-888, care *The Iron Age*, 428 Park Bldg., Pittsburgh, Pa.

#### SITUATIONS WANTED

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**STRUCTURAL STEEL SHOP FOREMAN**, responsible, competent to handle men and materials to best advantage of employers, wishes position. Address Box K-566, care *The Iron Age*, 239 W. 39th St., New York.

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**SALES ENGINEER.** Twenty years' experience as sales and engineering executive with large corporations. Desires to represent manufacturer of machine equipment or producer of materials. Location immaterial. Familiar with New York state. Address Box K-587, care *The Iron Age*, 239 W. 39th St., New York.

**MASTER MECHANIC or ERECTION ENGINEER**; trained executive with years of erection experience on all types of conveying machinery and record of results in several industrial plants as master mechanic, available on short notice. Address Box K-585, care *The Iron Age*, 239 W. 39th St., New York.

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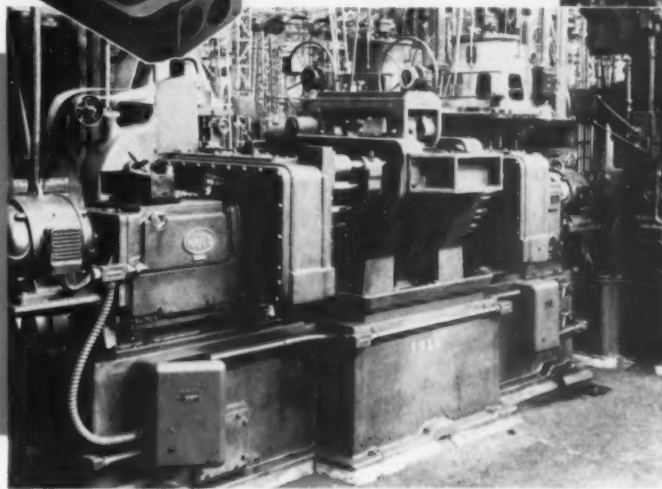
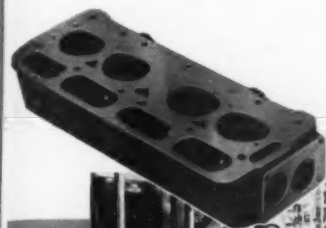
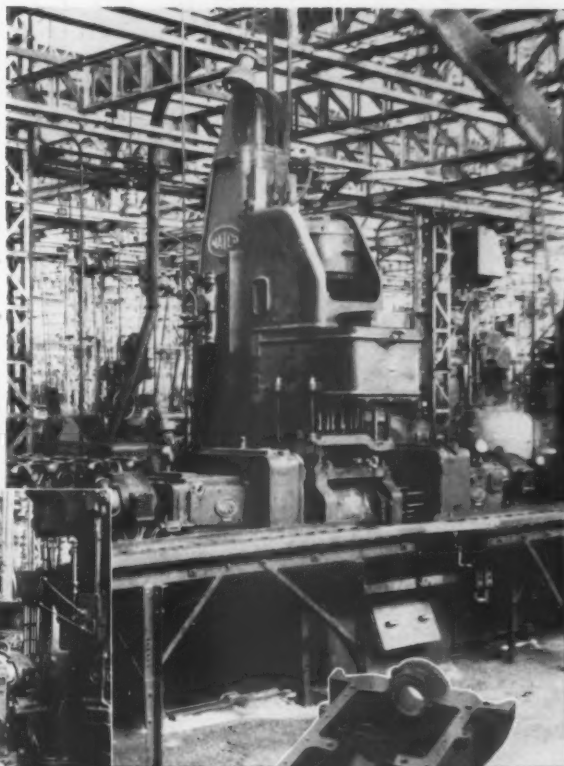
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At the right and below are shown two NATCO machines in actual operation in the customer's plant. Also shown is the cylinder head and cylinder block on which drilling, boring and chamfering operations are being performed.



## Flexibility and Interchangeability

of Drilling and Boring Equipment  
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PRODUCERS

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